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THE AUTOMOBILE

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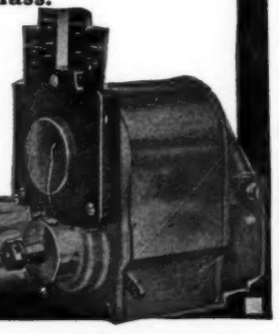

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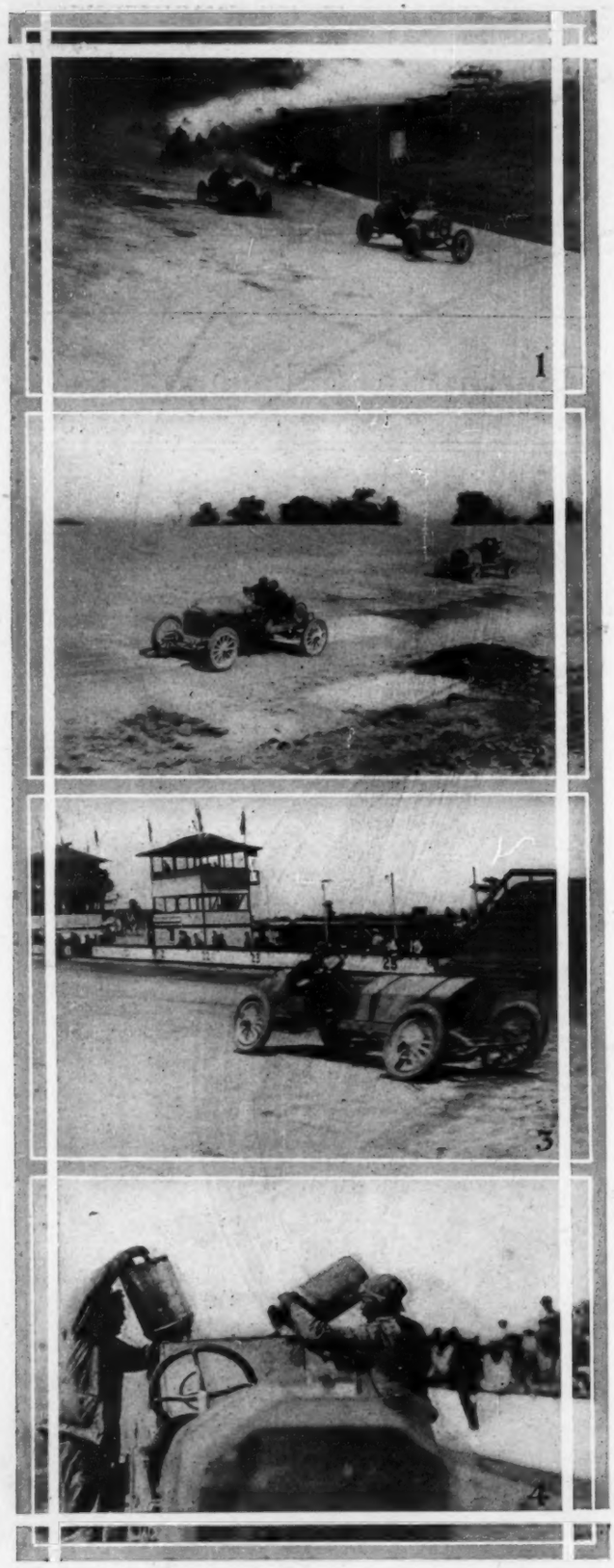
THE AUTOMOBILE

Cobe Trophy Feature of "Fourth" at Indianapolis

INDIANAPOLIS, July 1—For the second time this summer the Indianapolis Motor Speedway opened its gates this afternoon, and despite the excellent card provided a crowd of 6,000 people was lost in the grandstands. This July meet was of a more attractive nature than its predecessor in May, for the reason that it had a number of the trophies up for competition, including the Cobe Cup, the G & J Trophy, the Remy Brassard, and the Speedway Helmet. Two of these were down for decision this afternoon, one of them being the G & J Trophy, which was won by Bob Burman in a Marquette-Buick. The Speedway Helmet offered in the free-for-all at 10 miles, and which was won in May by Bob Burman, was captured this time by Eddie Hearne of Chicago, driving the 120-Benz.

LINE-UP FOR COBE TROPHY

It was a day of sensational record breaking, new marks being established in nearly every one of the stock car events. In the time trials Bob Burman, driving the Buick Special, set 1-4-mile mark at 08.5, an average of 105.87 miles an hour. In the 160-inch class, Herreshoff in a Herreshoff established a new mark of 5:30.61 for this division; Louis Chevrolet in a Buick reduced the 161-230 class 5-mile figures from 4:41.77 to 4:40.8, his own record; in the 231-300 class Burman in the Marquette-Buick smashed the 10, 20, 30, 40 and 50-mile records in the long-distance race for the G & J Trophy. His times were: 10 miles, 8:14.4, previous 8:16.8; 20, 16:21.5, previous 17:10.70; 30, 24:17.1, previous 26:06.11; 40, 32:06.5, previous 34:25.4; 50, 40:03.1, previous 42:03. In the 301-450 class Burman in the Marquette-Buick also cut the 10-mile record from 7:57.1 to 7:56.45, and established a record for 15 miles at 11:46.4. Another demonstration of pace was made by Hearne in the Benz in the Helmet race, in which his 10 miles in 7:13 average 83.14 miles per hour. The G & J Trophy race attracted a field of eleven cars which included Burman and Louis Chevrolet in Marquette-Buicks, Pearce and Heineman in Falcars, Fox in a Pope-Hartford, Harroun and Dawson in Marmons, Moore and Davis in Great Westerns, Miller in a Warren-Detroit, and Cook in a Black Crow. Chevrolet cut out the pace at the start and held the lead for 10 miles, when Burman, sore at being beaten for the Helmet by Hearne, zipped to the front, and set a merry clip for his team-mate. Chevrolet, however, was not beaten so easily, and at the 25-mile post



1—Just After the Start in the Cobe Trophy Race

2—Burman and A. Chevrolet Fighting it out on Turn

3—Aitken in the National "60" Cutting for the Front

4—L. Chevrolet, Last Year's Winner, Stops for Gasoline

his number lead the others on the score board. Shortly after this, however, Burman again gained command, and from that point on held his field in check. All the way, however, he was grimly pursued by Chevrolet. Burman, however, had plenty up his sleeve and nearing the finish he felt so safe that he stopped at the pits to take on a supply of gasoline and oil. Even with this he had enough left to beat out Chevrolet by 4 seconds. Pearce in a Falcar had stuck to his task like a veteran and as a result of his perseverance he brought his car home in third place, just ahead of Fox in a Pope-Hartford. In fifth place was Heineman in the other Falcar, while the other two cars that finished the race were the Great Westerns driven by Moore and Davis. Dawson in a Marmon stopped at 45 miles. Miller in the Warren-Detroit went 25, while Harroun in a Marmon and Cook in a Black Crow stopped in their third lap.

Striving for the Speedway Helmet were Zengel in the Chadwick, Hearne in the Benz, Ireland in a Stoddard, Harroun in a Marmon, Louis Chevrolet in a Buick Special, and Wilcox in the Simplex. Burman and Aitken, although entered, did not answer the call the first time, and got out on the track just as the field was breaking for the flying start. It was called no start, however, so Aitken and Burman lined up with the others on the next trial. The early stages of the battle proved a struggle between the National and the Benz, and these two led past the judges' stand on the second lap. Chevrolet's Buick and the Simplex had dropped while Harroun, Zengel, and Ireland were bringing up in the rear. Hearne after this assumed command, having taken the lead away from Aitken who had turned the 5 miles in 3:40.3. Harroun was runner up, but despite his best efforts he could not catch his fellow Chicagoan, who won the race handily with the Chadwick in third place and the Stoddard fourth.

In the minor events Chevrolet in the Buick was the star, winning twice, while his team-mate Burman, in the Marquette Buick, also captured first place honors. The Alco driven by Grant made its debut as a Speedway candidate and won handily while other firsts went to the Herreshoff in its class, and the Maytag in the handicap.

INDIANAPOLIS, July 2—More records were smashed on the second day of the meet, the feature of which was the 100-mile race for the Remy brasserd, which was captured by Burman in the Marquette-Buick, with Dawson in a Marmon second, Harroun in Marmon third, and Arthur Chevrolet in a Marquette-Buick fourth. Burman made a remarkable drive of it, going the century without a stop in 20:35.6, as against the previous record of 1:23.43 made by Kincade in a National in the Prest-O-Lite race last May.

Thirteen cars started in this classic and it proved to be a battle between the Marmon and the Marquette-Buick. If points had been counted the Marmon would have captured the honors, but they weren't so the glory goes to Burman, who, however, had to drive his best in order to beat out the new start, Dawson, by a scant 5 seconds. The field that came to the tape included, besides these four, Kincade in a National, Pearce in a Falcar, Cook in a Black Crow, Moore in the Great Western, Louis Chevrolet in a Buick, Stinson in a Black Crow, Aitken and Wilcox in Nationals and Davis in a Great Western.

Kincade in the National made a bold bid for the race in the early stages, and for 30 miles he showed the speed of the party. Then Burman went to the front and flashed first past the tape at 40 and 50 miles. Sixty miles saw a new leader, when Dawson in the Marmon assumed command, holding the pace until past 70 miles. Then Burman came up again and, although grimly pursued by Dawson, the remainder of the distance he held his own and at the end had enough to gain the decision by only a narrow margin. Dawson made a plucky fight of it, but what hurt his chances was the stop he made at the end of the seventh lap for slight repairs which enabled Burman to go to the front. In the next to the last lap Dawson managed to pick up 8 seconds

(*Continued on Page 30*)

Glorious Fourth at Wildwood

WILDWOOD-BY-THE-SEA, July 2—Car No. 13, a large Franklin, driven by Miss Gallagher, belied its number to-day by winning the first sociability run of the North Wildwood Automobile Association from Camden to North Wildwood, N. J., about 121 1-2 miles, with a penalization of only 5 3-4 points.

The allotted time for the run was six hours twenty-three minutes, which included a stop at Alloway of fifteen minutes for luncheon.

In addition to Miss Gallagher, the only other winners of prizes announced this evening were the Chadwick, No. 26, driven by F. B. Wildman, of Norristown, Pa., which won second prize, with a penalization of six points, and third prize, won by Mrs. D. Walter Harper, in a Stanley Steamer, penalty 8 1-2 points.

The official cars of the run were the Franklin, pathfinder; Peerless, which carried the referees; Matheson, patrol No. 1; Peerless, patrol No. 2; Mitchell, press car. The officials were Clyde A. Woolson, referee; Clarence Cranmer, starter; H. N. Sharp, scorer; P. D. Folwell, A. A. A. representative, and J. L. Keir, contest chairman.

WILDWOOD-BY-THE-SEA, July 4—No records were broken at the meet here to-day, the mile track record of 41 2-5 seconds remaining unchanged. The honors of the day very easily belong to J. Fred Betz, 3rd, in his 90-horsepower Simplex, who, in the time trials, negotiated the mile in 45 seconds flat.

The main event of the day, the free-for-all, was captured by the Simplex in 51 1-5 seconds, the Houpt-Rockwell being a good second in 53 1-5. The Knox Giantess was third, Chalmers fourth.

Those who conducted the races were: P. D. Folwell, Representative Contest Board A. A. A.; C. A. Woolson, referee; W. G. Rhodes, assistant referee; C. W. Cranmer, starter; G. Proud and J. Ackley, announcers; A. C. Maucher, chief timer; H. B. Lasher, clerk of course; judges, W. R. Walton, W. Lyman and H. L. Hornberger; umpires, D. W. Boyer, W. Middleton and J. H. Beck; marshals, H. H. Hoffman, L. Smith, A. S. Murphy, L. G. Spingler, Charles Kraus, C. V. Stahl, A. Klein, H. H. Carver and D. C. Bayless. The summaries:

Runabouts, $1,200 and Under—

No. Car	Driver	Time
1. Warren-Detroit	G. G. Stranahan	1:06
2. Buick	Tom Wilkie	1:14 1-5

Touring Cars, $1,201 to $2,000—

1. Buick	P. Hines	:59 3-5
2. Buick	Tom Wilkie	1:09 3-5
3. E-M-F	Frank Yerger	1:10

Touring Cars, $4,000 and Over—

1. Houpt-Rockwell	Harry Hartman	:59 4-5
2. Houpt-Rockwell	Stanley Martin	1:10

Touring Cars, $2,001 to $3,000—

1. Stoddard-Dayton	C. A. Warren	1:05 1-5
2. Speedwell	Ernest Stein	1:06 1-5

Touring Cars, $3,001 to $4,000—

1. American	R. Fertig	:58 2-5
2. Palmer-Singer	George Parker	:59

Stripped Chassis, $1,200 and Under—

1. Waren-Detroit	Geo. F. Stranahan	1:01 1-5
2. Warren-Detroit	J. L. Fritz	1:01 3-5
3. Warren-Detroit	Tom Berger	1:06 1-5

Stripped Chassis, $2,001 to $3,000—

1. Stoddard-Dayton	C. A. Warren	1:03 2-5
2. Jackson	Ira L. Brown	1:08 4-5

Stripped Chassis, $1,201 to $2,000—

1. Pullman	H. P. Hardesty	1:01 4-5
2. Speedwell	Ernest Stein	1:04

Stripped Chassis, $4,000 and Over—

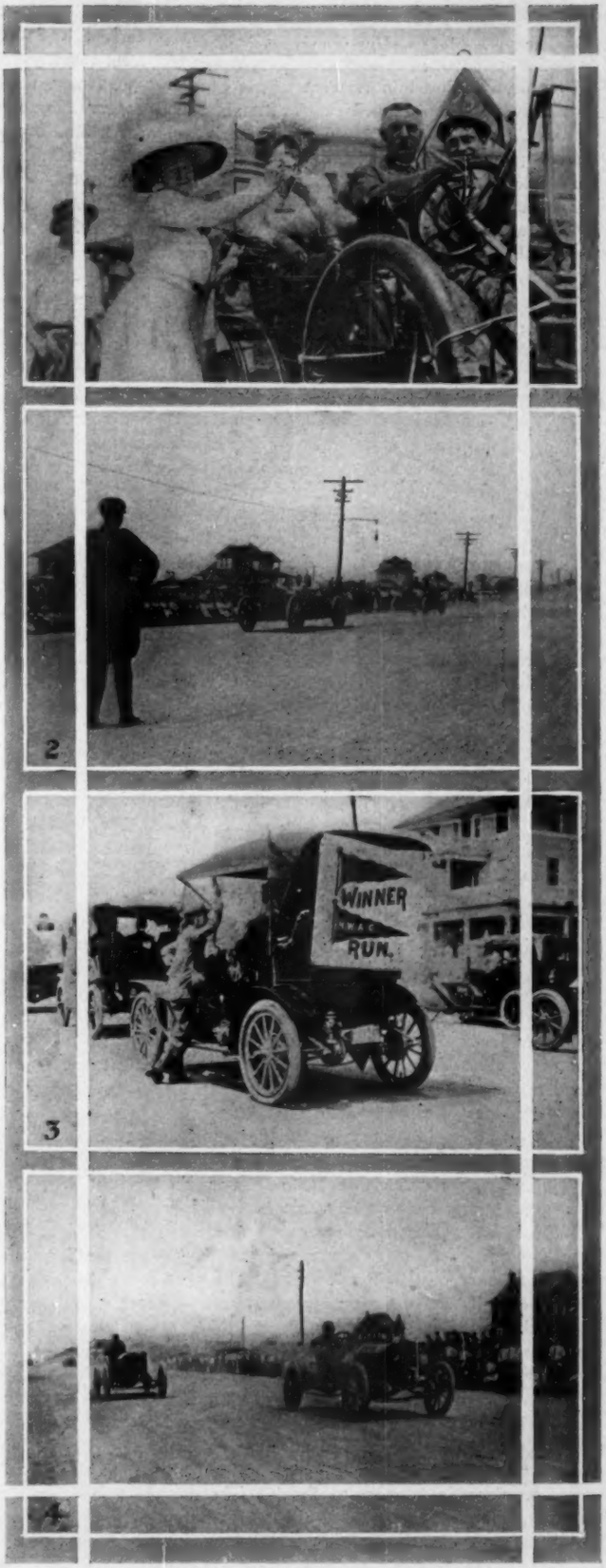
1. Simplex	J. Fred Betz, 3d	:48 3-5
2. Houpt-Rockwell	Stanley Martin	:53

Free-for-all—

1. Simplex	J. Fred Betz, 3d	:51 1-5
2. Speedwell	Ernest Stein	:53 1-5
3. Knox Giantess	Louis Disbrow	:54 4-5

Time Trials—

Car	Driver	1st Trial	2d Trial
Simplex	J. Fred Betz	:45	:47
Knox Giantess	Louis Disbrow	:52	:51 1-5
Chalmers	C. J. Rogers	:55 3-5	:53 3-5
Houpt-Rockwell	S. Martin	:48 2-5	:51
Warren-Detroit	Tom Berger	:58 4-5	:61 1-5



1—Handing Prize to Lucky Number Car in Parade

2—American Traveler, Winner of Event No. 5

3—Winning Franklin, Driven by Miss Gallagher

4—Tom Berger Sending Warren-Detroit Across in Front

Premier and Moline the

CHICAGO, July 2—By decision of the referee given here to-day No. 1 Premier, driven by Ray MacNamara, was declared winner of the Glidden Trophy, with a total penalty of 93 points. Second honors went to the Chalmers 30, No. 5, with 116 points marked against it. Third place was captured by the Maxwell entry, No. 7, driven by H. E. Walls, with a final score of 208 points. No. 2 Premier was fourth, with 806 points; No. 10 Glide fifth, with 2,247 points, and No. 15 Cino sixth, with 2,414 points.

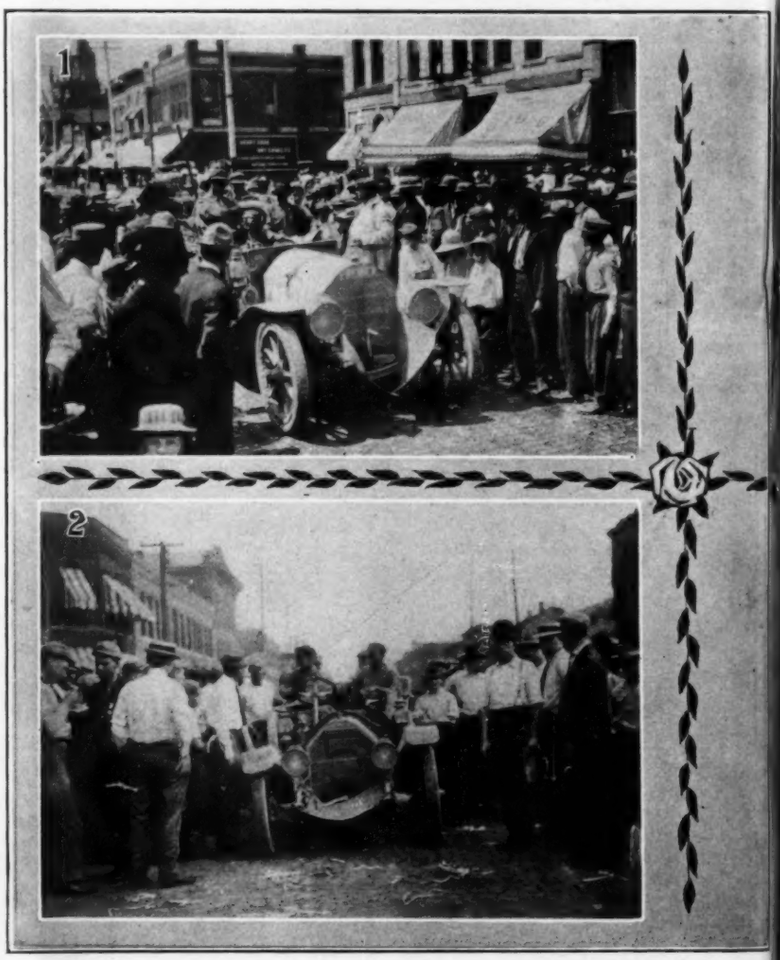
The winning honors in the Chicago Trophy event, which was under the same rules and over the same course as the Glidden, went to No. 100 Moline, driven by C. H. VanderVoort with the lowest score in the field—19 points—the performance of this car being one of the features of the contest, in that it made every checking station on time, took a perfect brake test and lost but 12 points for work on the road and only 7 points in the gruelling final examination at the end of the run in Chicago. This car, according to the rules, had to carry but two passengers, but made the entire 2,850 miles with four passengers, so that in this respect it competed under conditions identical with the Glidden cars. It performed under an 18-mile-an-hour schedule as compared with the 20-mile schedule of the Premier, which was due to its price classification. Second honors in the Chicago Trophy class went to Jesse Illingworth, in No. 107 Maxwell runabout, with 51 points against it. Another Moline, No. 102, driven by F. E. Salisbury, was third with 64 points, and the third Moline No. 101, was fourth, with 481 points. Fifth in this classification went to entry No. 103 Lexington, which it will be remembered broke a side member of its frame running into a sink hole in Arkansas and lost nearly 2,000 points thereby, its final score being 2,042.

Of the twenty-six cars which left Cincinnati three weeks ago on this long test only eleven came into Chicago contesting for either the Chicago or Glidden trophies. There were, however, five of the original entries which entered the city, either as non-contestants or otherwise. Of these five No. 3 Chalmers was disqualified at Oklahoma City for doing work on the car in the garage, but completed the run as a non-contestant, covering every foot of the course. No. 4 Chalmers withdrew at Lawton, Okla., in order to do confetti work, made imperative because of one of the confetti cars breaking down. This car covered the entire distance of the circuit. No. 12 Ohio also completed the entire circuit as a non-contestant, as did No. 106 Falcar, driven by Van Sicklen in the Chicago Trophy division. To this list must be added two four-cylinder Cartercars, that, owing to rear axle trouble, had to lose a day's time and cut the course 100 miles or so in order to catch up with the procession. One of these cars it is asserted actually traveled further than the route called for because of getting lost.

There were several cars which accompanied the tour from the start in a non-contesting capacity, and which covered every mile of the route, these being a Chalmers confetti car, a Columbia car carrying the referee and acting as pacemaker, two Cadillac gun cars carrying four people each, as well as a quick-firing gun, the Halladay press car and the Great Western press car.

As the complete tabulation shows there were but five cars in the whole tour that made perfect control performances—that is, were not late at one checking station on the entire tour—these five cars being: No. 1 Premier, No. 5 Chalmers, No. 7 Maxwell, No. 100 Moline and No. 107 Maxwell. In this respect the Maxwell entry made the best showing, in that it entered but two cars in the two contests and both of these made all controls on time from start to finish. There were two Premiers entered, but one lost out on controls, and of the three Molines, only one was clean on all the checking stations. Only one of the three Chalmers made all checking stations on time.

The final examination at the completion of the tour was a strenuous one in every sense of the term. The first phase of this contest was a brake test in which the cars crossed the braking line at their competing speed of 18 or 20 miles per hour, and their distance was taken for stopping with hand brake, and then with foot brake. Only three of the eleven cars made perfect brake performances—that is, stopped the car under 50 feet with each set of brakes, these three cars being No. 100 Moline, No. 101 Moline and No. 107 Maxwell. There were four other cars that stopped within the 50 feet with the foot brake, but failed with the hand or emergency, these being No. 5 Chalmers, No. 7 Maxwell, No. 102 Moline and No. 103 Lexington. The winning Premier No. 1 was assessed 16 points on its foot brakes, and 48 points on its hand brakes. No. 5 Chalmers, which finished second in the Glidden, was assessed 36 points on the hand brake. No. 7 Maxwell, which lost 33 points on the hand brake, lost these due to a wood shoe forming a part of the braking surface of one brake having been lost.



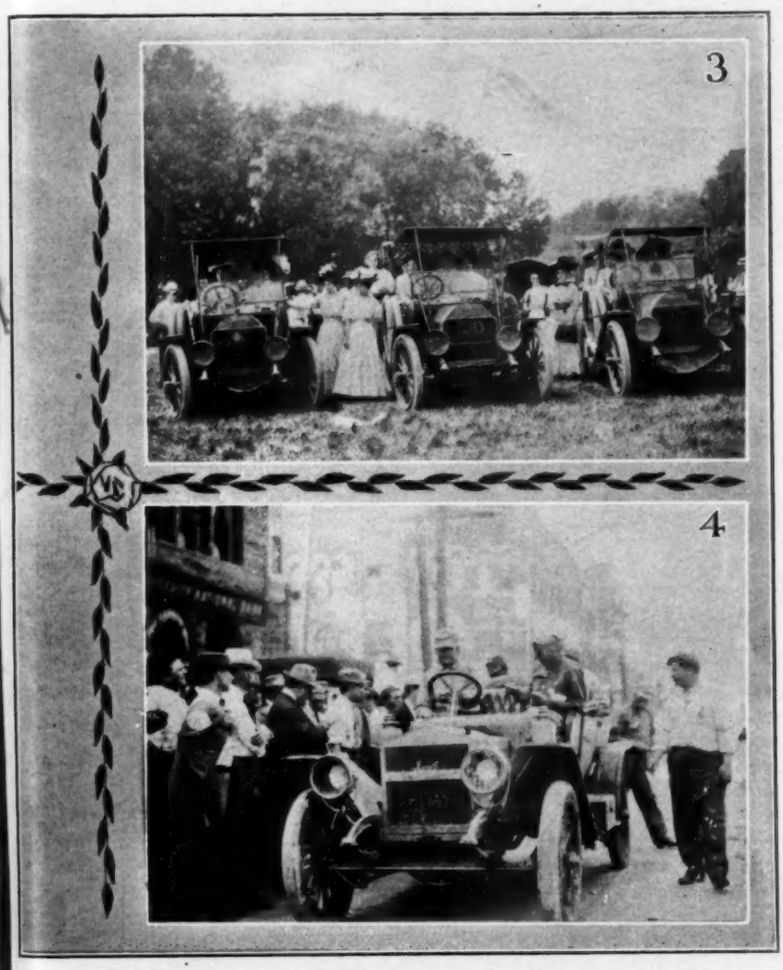
1—Premier at Marengo, Iowa, Noon Control
2—Chalmers "30" Checking in at Davenport, Iowa

The second phase of the final test was for clutches, the cars having to bring the front wheels to an 8-inch curb and either climb the curb, spin the rear wheels or stall the motor. Only one car was penalized on this score, that being the Lexington No. 103, which was penalized 5 points. After the clutch test the cars were garaged and completely washed so that the technical committee had an opportunity to look over every detail of them for bent, impaired or lost parts. In order to do this the spring wrappings were taken off and no precaution neglected to make the test as thorough as possible. This test revealed several broken fender irons, loose spring clips, and in four or five cases

Glidden Tour Winners

the front springs had slipped back or forward on the axle. Two or three cars showed loose spokes in the wheels and there were two cases of hub-flange bolts being loose. Because of having carried too much weight on the running boards there were two cases of fender and running board brackets having been broken. It was remarkable that after so long and gruelling a test there should have been little trouble as the examination revealed. The complete penalties assessed against each car appear in the tabulation herewith, as well as the points levied in each case.

In summing up the performance of the eleven cars it is most



3—Molines, 100 and 101, and Parry No. 105 at Guthrie Center, Ia.
4—Maxwell Checking In at Wichita, Kansas

interesting to note that the three Moline entries and No. 107 Maxwell passed the cleanest examinations at the finish. No. 100 Moline had but 7 points, No. 101 had only 3 points and No. 102 set the record of the trip with only 2 points against it, one being for a muffler rod nut lost and the other for the brass sleeve outside of the steering column being loose. The No. 107 Maxwell received but 8 points.

In the Glidden end of the contest the No. 1 Premier passed the best examination with 15 points assessed against it; then came No. 2 Premier with 20 points and No. 5 Chalmers with 41.

There was not a solitary car that did not receive technical penalties for work done on the road. The car with the cleanest record in this respect was No. 1 Premier with 9 points for taking on water and repairing and replacing fan belts. No. 100 Moline was a close second with but 12 points. The No. 5 Chalmers made the most remarkable road record, in that it went for five days longer than any of the other contestants with its clean road score, and finally lost it on the run into Wichita, Kan., when a fender iron crystallized.

The announcement of the Glidden award was delayed until to-day because of a protest entered by the Chalmers Company against the Premier entry, this protest having been handed to the referee in Kansas City. The protest was on the grounds that the Premiers were not stock in that they carried 1 1-2 gallon oil tanks on the right side under the tonneau floor, and had a hand pump fitted for pumping the oil from these tanks to the crankcase of the motor. An investigation was made and the Premier company claimed to have 74 cars fitted with this form of oiler. The referee would not allow the protest on the ground that the protest, which took into consideration the validity of entry, should have been made before the start of the tour. It is understood that the Chalmers Company is discussing the question of appealing the matter to the Contest Board, which it has the privilege of doing.

The Chicago Motor Club arranged for a checking station in Garfield Park, on the outskirts of the city. At this point a procession was formed of all the contesting and non-contesting cars in the Chicago and Glidden trophies, led by a band.

In the final technical examination detailed penalties were inflicted as follows:

Glidden Trophy

Premier Car No. 1—10, front wheels, spindles, loose; 1, water connection, leaking; 2, engine hanger belt broken; 2, spring clips loose—total 15.

Premier No. 2—2, cylinder head plate, leaking; 5, spring leaf broken, right rear; 5, spring leaf broken, left rear; 1, ignition shaft jaw coupling, loose; 1, hub flange bolt, broken; 4, rear reach rods on foot brakes, bent; 2, rear reach rod lever on foot brakes, bent—total 20.

Chalmers, No. 5—6, fender iron broken; 2, steering gear loose on frame; 1, muffler cutout wire broken; 2, body bolt lost; 1, body bolt loose; 2, shackle bracket loose; 2, ignition terminal broken; 25, tie rod bent—total 41.

Maxwell, No. 7—2, bumper plate lost; 4, four spring clips loose; 5, spring leaf broken, right front; 2, grease cup lost; 5, front wheel loose; 5, steering yoke pin loose; 50, defective brake; 1, body bolt loose; 2, fender bracket loose; 5, front wheel bearing loose—total 81.

Glide, No. 10—5, spring leaf broken, right rear; 2, muffler loose; 150, rear axle housing parted; 2, fan belt lost; 25, fan pulley, broken flange; 1, radiator, leaky connection; 5, spring leaf broken, left front; 6, three spring straps lost; 5, front wheel, loose, left; 5, front wheel, spokes loose, left; 5, front wheel, loose, right; 5 front wheel, spokes loose, right; 5, fender broken; 6, step bracket, broken; 15, steering column crank loose—total 242.

Cino, No. 15—6, three grease cups lost; 15, rear spring bracket, bent; 1, pressure pipe on gasoline feed line, loose; 20, radiator leaky; 2, engine bolts, loose; 10, front wheels, both loose; 2, fender loose; 1, muffler, final exhaust pipe loose; 12, two fender irons broken; 5, spring leaf broken, right front; 5, spring leaf broken, right rear; 5, spring leaf broken, left rear—total 84.

Chicago Trophy

Moline, No. 100—5, front wheel bearing, loose; 2, fan blades, impaired—total 7.

Moline, No. 101—1, gasoline leak; 2, steering column, finishing plate on dash, lost—total 3.

Moline, No. 102—1, muffler nut, lost; 1, steering column sleeve loose—total 2.

Lexington, No. 103—5, ball and socket timer connection broken; 10, both steering yoke bearings loose; 5, wheel bearing loose; 2, grease cup lost; 500, frame side member broken—total 522.

Maxwell, No. 107—1,spring clip loose; 2, nut on step bracket bolt lost; 1, front union on muffler loose; 2, rear fender screw lost; 2, fan bolt lost—total 8.

FINAL STANDING OF GLIDDEN TOUR CONTESTANTS

Glidden Trophy

No.	Car	Driver	Road Pen. Control	Road Pen. Tech.	Road Pen. Sub Total	Final Penalties Foot Brakes	Final Penalties Hand Brakes	Final Penalties Spring Sag	Final Penalties Clutch	Final Penalties Axles	Final Penalties Tech.	Grand Total
1	Premier	Ray MacNamara	0	9	9	16	48	0	0	5	15	93
5	Chalmers	Wm. Bolger	0	39	39	0	36	0	0	0	41	116
7	Maxwell	H. E. Walls	0	59	59	0	33	0	0	35	81	208
2	Premier	Chas. Bollenger	220	500	720	15	41	0	0	10	20	806
10	Glide	Fred Cassel	785	1070	1855	73	37	0	0	40	242	2247
15	Cino	Walter Donnelly	977	1168	2145	38	142	5	0	0	84	2414

Chicago Trophy

100	Moline	C. H. Vandervoort	0	12	12	0	0	0	0	0	7	19
107	Maxwell	Jesse Illingworth	0	43	43	0	0	0	0	0	8	51
102	Moline	F. E. Salisbury	25	37	62	0	1	0	0	0	2	64
101	Moline	J. A. Wicke	90	388	478	0	0	0	0	0	3	481
103	Lexington	J. C. Moore	508	874	1382	0	113	0	5	0	522	2042

Owen Cars with Big Wheels and Left-Hand Drive

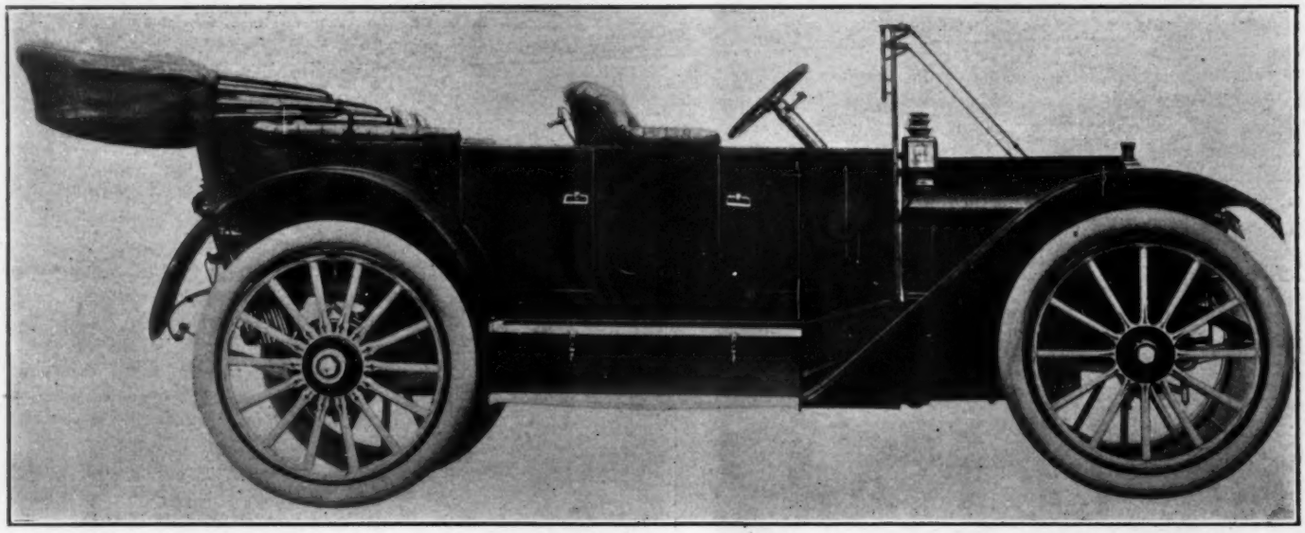


Fig. 1—The car complete with a gunboat type of body, left-hand steer, control amidships and large diameter wheels

COMBINING, as it does, the results of past years of experience as mechanics, designers and producers, unhampered by any questions of factory equipment, firm policy or executive prejudice, it follows that the 1911 product of the Owen Motor Car Company, of Indianapolis, Ind., should represent the last word in latter-day motor car construction.

The fundamental points upon which the Owen product has been built include, among others, these primary essentials: long-stroke engine, left-hand steer, right-hand control, low gravity, closed-front, straight-line body and high wheels.

While much has been said and written as to the relative merits of right and left-hand steer, it is the experience of many qualified drivers that a car can be handled much better from the left than from the right. With the traffic rules in force in this country it is more essential that a clear view of the road to the left be had than to the right; a left turn is fraught with more danger than one to the right; besides, it permits the occupant of the guest seat to alight directly on the curb and not in the mud of the street, at the imminent risk of being run down from the rear by an automobile traveling in the same direction.

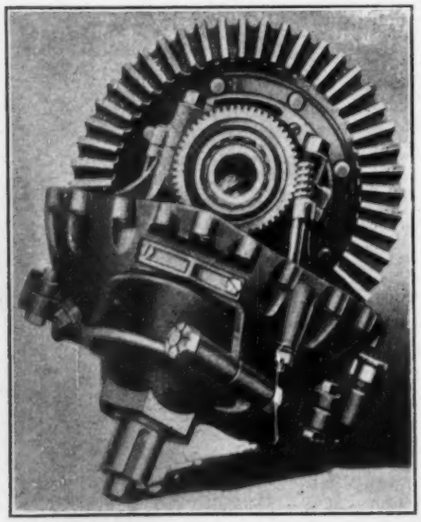


Fig. 2—Differential and bevel drive unit which are separately assembled

Forty-two-inch wheels, the standard equipment of the Owen, make for ease in heavy going, increased traction area, comparative freedom from side-slips and high mileage—in the latter respect the builders claim an increase of from 200 to 300 per cent.

The double-dropped and offset frame members facilitate a greater turning angle and enable the production of a high-wheeled car with a lower gravity with respect to spring suspension than is possible by ordinary construction.

The closed-front, straight-line body, the standard Owen equipment, is a much-appreciated guard against wind and weather, and a preventive of trailing robes or garments. Besides, the straight lines set off the finish, all the mouldings being worked out of the solid wall of the sides. The absence of double mouldings and other embellishments conveys an idea of unadorned simplicity.

Notable Mechanical Refinements in the 1911 Car

Passing from the general appearance of the car as it is shown in Fig. 1 to the motor, the left side of which is presented in Fig. 5, opportunity will be taken to comment upon the excellence of the magneto installation. It rests upon a pedestal which blocks it up to the exact right height, so that the armature spindle is in correct alignment with the extension of the driving shaft, and a universal joint intervenes, the function of which is to compensate for such minute differences as may be inadvertently interposed. The magneto is so placed that the wiring of the high-tension system passes up through a conduit to the distributing box, which is parallel to the line of spark plugs, and by a special system of terminals the spark plugs are so joined that each of them may be disconnected with a minimum of effort for purposes of testing.

The upper half of the motor case carries a pair of arms which extend out to the chassis frame, but instead of a sod-pan the aluminum case is flanged out between the arms, serving as a perfect substitute for the sod-pan, and affording a platform on which to rest the auxiliaries, and to place tools which may be used in making ad-

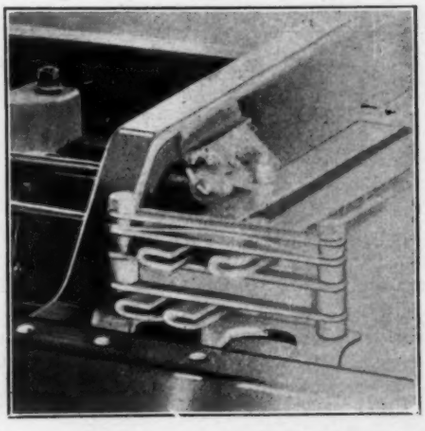


Fig. 3—Details of the equalizing bars for the brakes

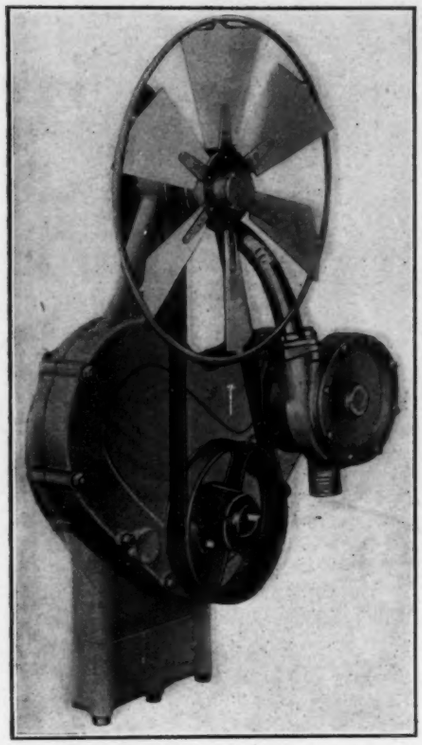


Fig. 4—Front end of the motor showing the fan, method of driving, and water pump

justments on the road. As a further incident of this construction, this integral flanging acts as a stiffener between the arms. The cylinders are cast in pairs, and are of the T-head type, there being two pairs for the 4-cylinder motor. Glancing at the illustration again, it will be observed that one of the tappet housings shows at the rear above the flywheel. The row of valve mechanisms comes on the right side of the motor, and the lifts are enclosed by a telescoping sleeve system, so that they are protected from the dust accumulations, are muffled, and may be gotten at readily. The many other nice mechanical refinements are so clearly shown in the illustration as not to demand further favorable comment.

In the cooling system, beyond stating that the radiator is of well-chosen capacity, additional refinement will be the better understood by referring to Fig. 4, which shows the front end of the motor, the fan bracket and fan, also the belt, and the driving pulley which is double-shrouded and extends out from the halftime gearcase, being pressed on the stub end of the crankshaft. The centrifugal pump is also shown at the right of the fan belt; it is of unusually large capacity and is driven by a pinion which meshes with the halftime gear system. Lubricating oil is carried

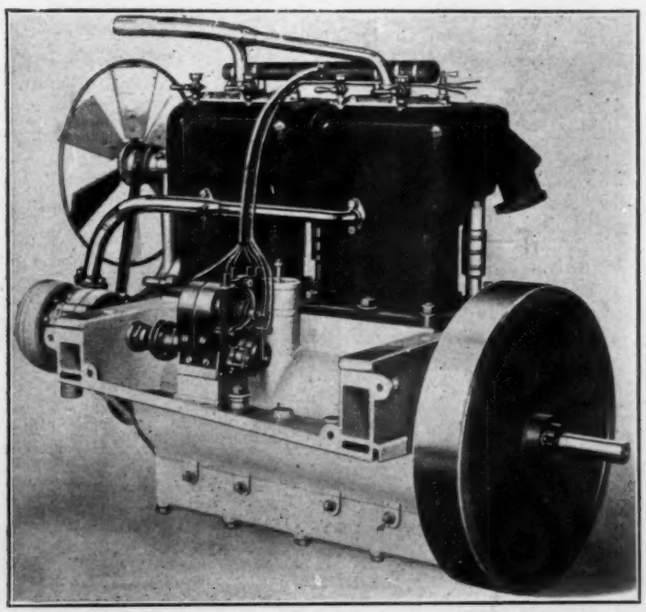


Fig. 5—Left side of the motor presenting details of the magneto mounting, method of wiring, and shape of the motor case

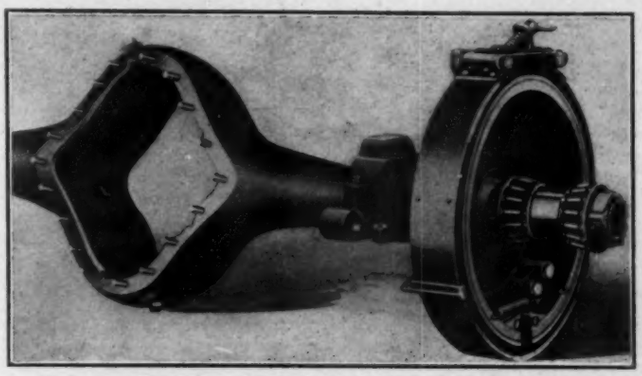


Fig. 6—Live rear axle housing presenting Timken roller bearing mounting, brakedrum, and two sets of brakes

in a commodious well in the bottom half of the crankcase, and the gear pump which circulates the oil is inserted in the case, and readily detached for purposes of cleaning or inspection. Fig. 7 shows the filler for the lubricating oil and offers an excellent idea of the nice eye to detail which the designer expended upon this car.

A part of the rear axle is given in Fig. 6, and shows the Timken roller bearings, large diameter brakedrum, external constricting band and internal expanding band, also the spring perch, and the enlargement in the mid-position of the axle which takes the bevel-and-differential unit which is shown in detail in Fig. 2. The strength of the rear axle is adequately depicted in Fig. 6, but to do the subject justice it will be necessary to enlarge somewhat upon the advantages which are present in the unit method of assembling the bevel drive and differential gear sets. This set is mounted on annular-type ball bearings; the bevel pinion and its meshing gear are fixed in their relation by a definite machine method which offers no opportunity for a curious autoist to throw the pinion and gear out of their true relation, but this point ranks low in the series of advantages as compared with the opportunity which is afforded the men who work on the system; they are enabled to do a definite and accurate machine job, using suitable templets and gauges on a jigging basis. Noiseless performance, coupled with high efficiency and long life, are therefore normal expectations. Fig. 3 is just a detail in the chassis work. It shows the equalizer bars for the brakes, and their guides above the level of the chassis frame.

Goodrich, Diamond, Fisk or Firestone are tire options.

The Owen price propositions include: Six-passenger touring car, fully equipped, $4,000; two-passenger runabout, fully equipped, $4,000; Berlin (fore-door) limousine, $5,400; Berlin (fore-door) limousine, body, $1,800; chassis, $3,600.

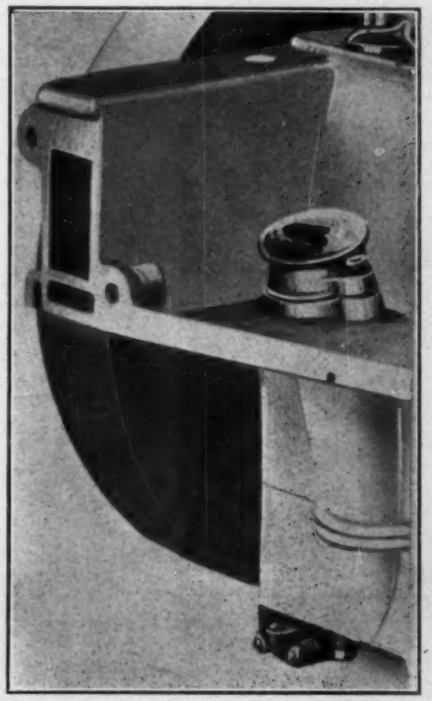


Fig. 7—A detail of the lubricating system

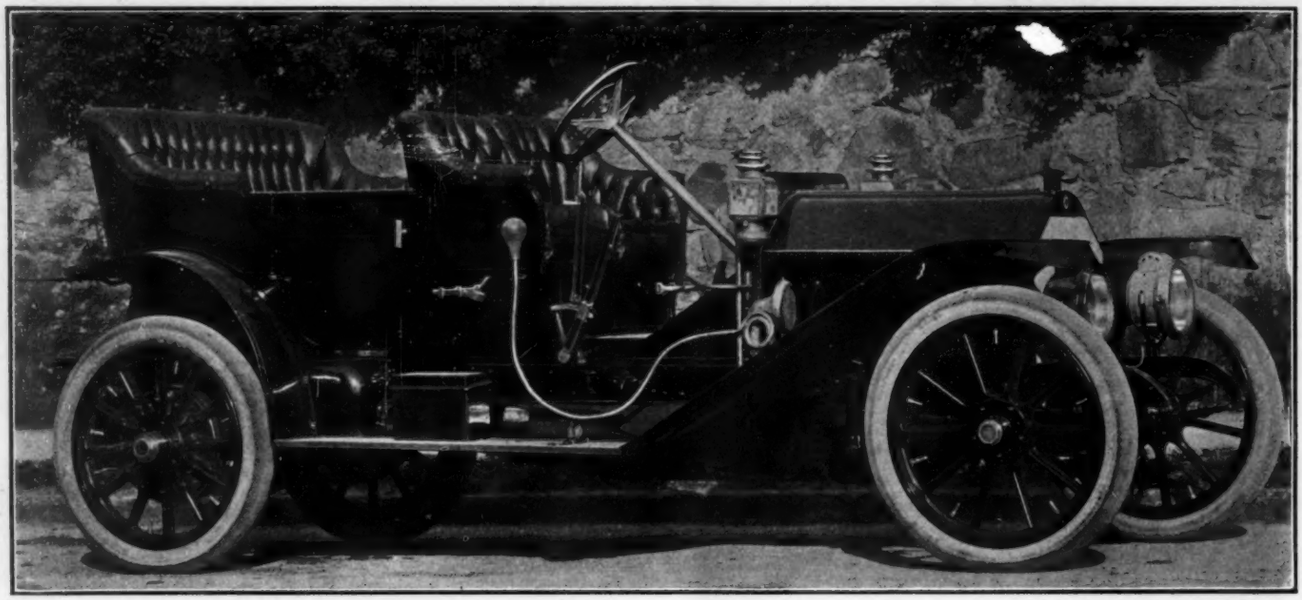


Fig. 1—Side elevation of Six-Forty Touring Car showing wide side entrance, flaring mud guards, ample room, and large diameter steering wheel.

Palmer & Singer Offer Four Models for 1911

ADHERING to their 1910 policy, Palmer & Singer announce four models for 1911—two six-cylinder and two four-cylinder cars. The sixes will be the Six-Sixty and the Six-Forty; the fours, the Four-Fifty and the Four-Thirty. The demand for more power by the four-cylinder clientèle of the company has been met by the introduction of the Four-Fifty, while the new Six-Forty has been introduced for those of the Palmer & Singer six-cylinder devotees who desire a lower-powered, smaller car. The Six-Forty is equipped with either five-passenger touring or closed body, as is the Four-Fifty. The other models are offered in the same wide range of body equipment which characterized the 1910 cars. Uniformity characterizes the principles of construction underlying all four models; the engineering motif being the same for all the cars made.

The reliability and smooth-running qualities of the Palmer & Singer are to be attributed in large measure to the special triple jet carbureter used on them. By its use the mixture of gasoline and air is automatically controlled so that it always suits the motor speed and the climatic condition, giving uniformity and economy of fuel.

While the pressure feed system is normally used, gravity feed will be provided on small runabouts, if desired. Pressure is supplied by a pressure regulating valve on the exhaust side of the motor, having a special safety adjustment. A gauge and hand air pump on the dash are provided.

All Palmer & Singer motors have been designed for the high-tension dual ignition system with separate spark plugs, both being located on the inlet side of the motor. A battery high-tension distributor and single vibrating coil on the dash and a Bosch magneto are provided, a switch permitting either, or both, to be employed.

Barring the difference in sizes, the models are identical in design and workmanship with the Six-Sixty, except that an annular ball bearing is used for the front crank-shaft bearing of the Six-Forty, the cylinders of the little six are cast en bloc, three together, and the valves on the smaller four are both on the same side.

The clutch is housed in the flywheel in the two larger models, while in the smaller pair it is in a separate oil-tight compartment of the transmission case to economize space and permit the use of a longer propeller shaft.

The drive is direct through integral gear on the fourth speed on the Six-Sixty and Four-Fifty models, and direct on the third on the lower-powered cars.

Thirty-six-inch wheels, front and rear, are the standard equipment on all except the Town Car, with conical roller bearings on the larger models and imported annular ball bearings on the smaller. Diamond tires, of a size suitable to the weight of the different models, and amply large in all cases, are Palmer & Singer standard equipment.

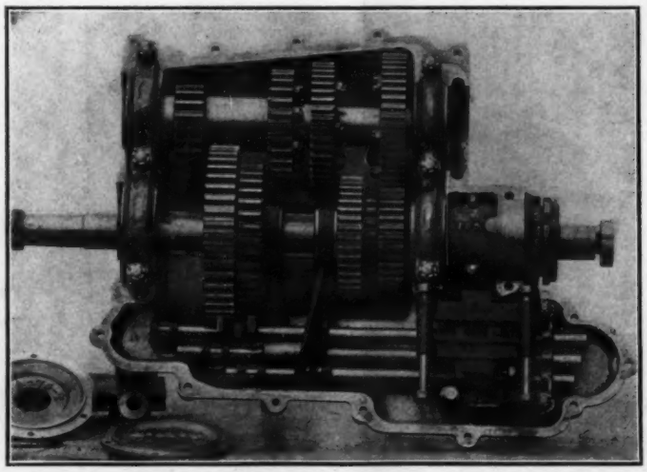


Fig. 2—Four-speed selective sliding gear transmission, with annular type ball bearings, and selectors within same housing

Mechanical Refinements on a Six-Cylinder Basis

The general appearance of the car is shown in Fig. 1, referring to the 40-horsepower, 6-cylinder power plant, and among the prominent points is the fact that the length of the bonnet is not marked, which is an indication that the 6-cylinder power plant is compactly designed.

The new "Little Six" motor is shown in elevation in Fig. 4, looking at the right side with magneto in front, driven from a shaft which extends out of the halftime case, the other end of the shaft having a pinion which meshes with the halftime gear system. The carbureter is located in a mid-position, high enough up to be accessible, and is connected by a straight away

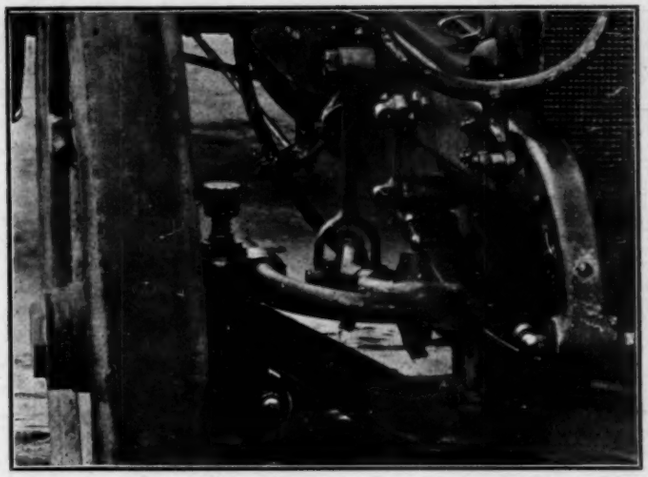


Fig. 3—Detail of front axle presenting an I-section with flat perches for semi-elliptic springs, substantial knuckle with a through pin and means for lubrication

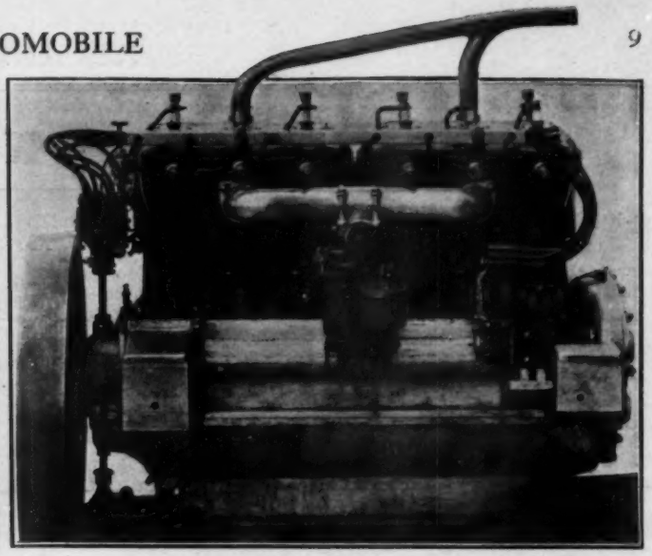


Fig. 4—Right side of "Little Six" motor, showing magneto in front, connections to spark plugs and timer at back, also the carbureter and its manifold connections

manifold to the two pair of cylinder castings, there being three cylinders in each casting. The wiring from the magneto extends in a loop up to a box, and a lead is distributed out of the box to each of the spark plugs in turn; some of the leads pass beyond, back to the timer, which is located at the rear of the last cylinder above the line of the diameter of the flywheel; rotation is given to the timer by a vertical shaft through a gear set on the end of the camshaft. The crankcase is in two halves flanged on the horizontal center and below the dip of the connecting rods, a long oil well is provided, and oil circulation is maintained by means of a gear pump which is driven by a vertical shaft in line with the vertical shaft which gives rotation to the timer. There is a cover on the underside of the lower half of the crankcase which may be removed at will and sediment as it collects in the bottom of the oil well may be scraped out through this accommodation. The flywheel is of large diameter and relatively light, considering the flywheel effect afforded; the spokes are fan fashion, and serve for pulling air through the radiator in the cooling process.

In order not to confuse the situation, the illustrations and discussion here will be confined to the simple process of indicating the character of the work done, and the methods of design, it being the case that Palmer-Singer engineering is common throughout the four different models which are offered to 1911 patrons. As an illustration of transmission gear work, Fig. 2 is presented. It shows a four-speed and reverse sliding gear system of the selective type with the selective mechanism enclosed within the same case. The lay shaft is short and relatively thick, with all of the gears flanged on, excepting low, which is formed integral. The sliding members are of substantial construction, slip over splines cut integral, and direct on "high" is obtained by the meshing of an external with an internal involute type of gears. The shafts throughout are centered on annular type ball bearings of large sizes, and they are accurately fitted into their housings in the lower half and maintained in position independently of the upper half, bolting yokes being used for the purpose. The upper half of the case serves merely as a protection, and handhole covers are provided therein for the purpose of inspection. The detail of the reverse gear is shown in Fig. 5; it runs on a spindle in a yoke of a bell crank member which oscillates on a pinned fulcrum under the direction of a cam, which engages a roller attached to the free end of the bell crank member. Instead of sliding into reverse, this pinion is swung into mesh, describing an arc equal to the radius from the center of the fulcrum pin to the center of the pinion pin, so that engagement of the reverse pinion is in the radial relation with its mate.

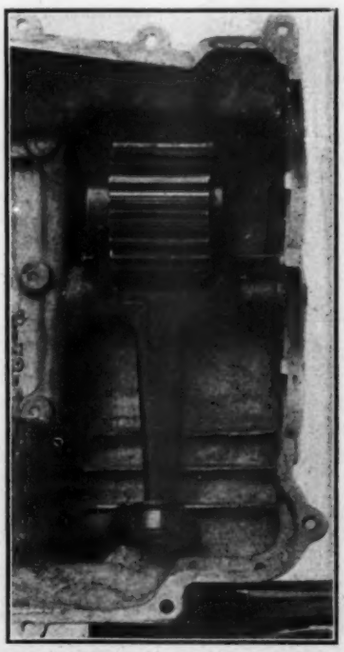


Fig. 5—Detail of reverse mechanism which lays in lower half of gear-case and is operated by a sliding cam engaging a roller on end of lever

As a further indication of the methods of design utilized in these products Fig. 3 is offered. It shows the I-section front axle, method of supporting the half-elliptic front springs, shape of the chassis frame at the point of fastening, how the lamp brackets are bolted on, and the steering knuckle with its large pin, and a substantial grease cup to provide lubrication, also the steering arm and a perspective of the connecting link between it and the steering lever which extends out to the chassis frame from the steering gear. Substantial universal joints are used in the steering system, and locking nuts obtain at every point so that when the parts are assembled in their tight relation they are so maintained, but disassembling is relatively simple, due to the definite means employed, and the locking nuts which may be undone as an initial effort.

Worthy Points for Special Mention

In the two larger models the clutch is housed in the flywheel, whereas in the remaining models it is in a separate oil-tight compartment of the transmission case. In all models the multiple disc type of clutch is used; it is composed of 47 discs of sawblade steel, operating in an oil bath. The clutch spring is adjustable, and the clutch trunnion is lubricated by two grease cups. Transmission is by propeller shaft to the live rear axle, and the bevel gear set is of nickel steel. The rear axle is of the full floating type, and hardened square ends engage with the differential pinion. Steel dogs transmit the power from shafts to road wheels. The rear axle housing is trussed, and a large removable cover gives access to the differential set for purposes of inspection and lubrication. Imported annular ball bearings are used throughout. The details of the brakes are worked out to a fitting end. The service brake operates by a foot pedal, is of the internal expanding type lined with "Raybestos," and the emergency brakes are operated by a side lever, they being of the external constricting type. The channel section frames have four cross members.

Empire "Twenty"—Hails from Indianapolis

PROCEEDING on the theory that a plethora of models means increased cost of production and a corresponding increase in selling price, the Empire Motor Car Company, of Indianapolis, is devoting the best energies of its entire plant to the production of the Empire "20" Model C—a two-passenger roadster, swung low and presenting a stylish, racy appearance. Every detail throughout the distinctive and exclusive design is executed with the two-passenger idea in mind. Rumble seats, surrey seats and other combinations are not offered, and it is evident at a glance that the car is not in the convertible class.

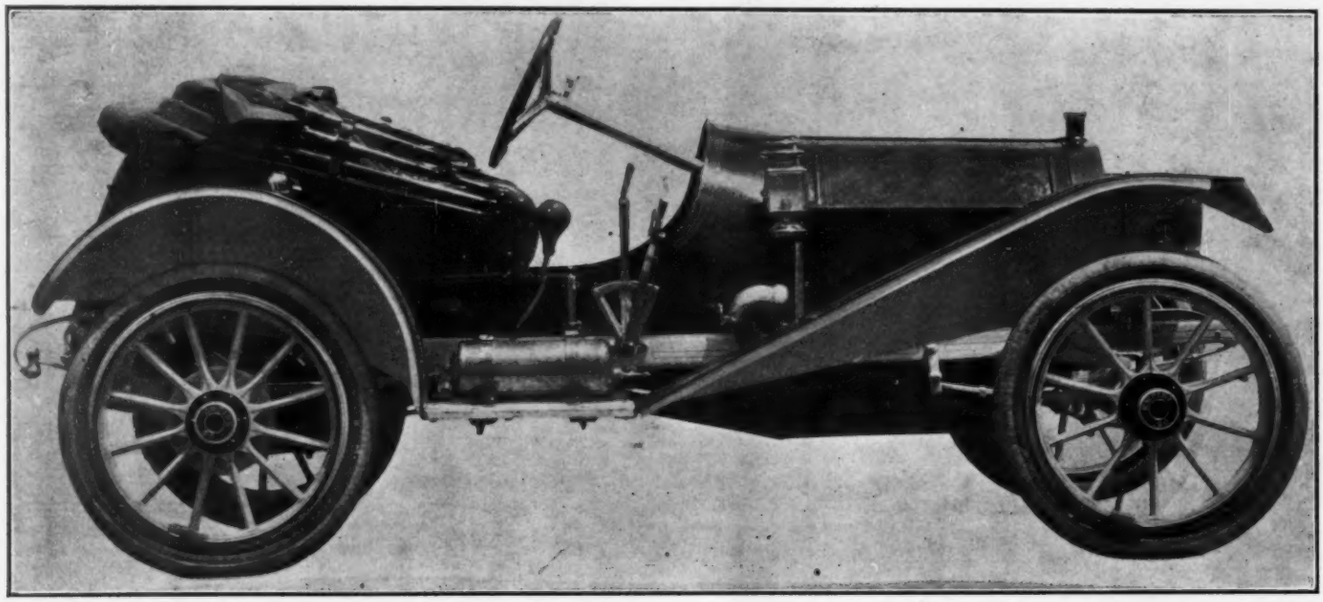


Fig. 1—Side View of Model C Empire "Twenty" Automobile, showing flaring mud guards, low seat, convenience of side levers, etc.

The Empire "20" is not an assembled car, being made entirely within the company's plant. The spring suspension, the design of the seats and their location with reference to the axle, the drop frame, the large wheels and the enclosed dash are points of refinement that give the car exceptionally easy riding qualities and make it a roadster of the most comfortable type.

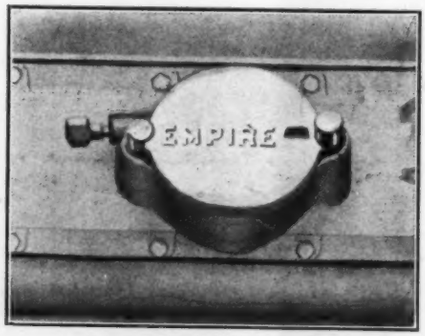


Fig. 2—Removable handhole cover on detachable plate of upper half of crankcase

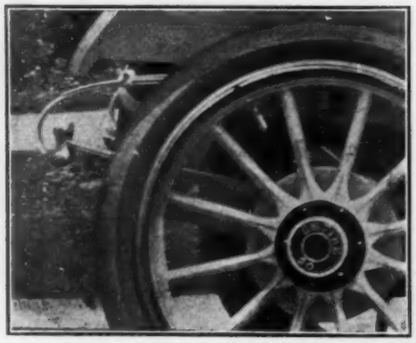


Fig. 3—View of rear suspension, showing three-quarter elliptic springs

Unit Power Plant

The motor is of the 4-cycle, water-cooled type, rated at 20 horsepower, with T-head cylinders having valves on opposite sides as shown in Fig. 5. In this view, the magneto is indicated on the left side of the motor toward the front, and a Wheeler & Schebler carbureter is located back of the magneto, but high enough up to be in a perfectly accessible position. The halftime gears are enclosed in an oil-tight case, and the magneto is driven by a stub end shaft which projects back from an extension of this case, the other end of the shaft having a pinion which meshes with one of the halftime gears. The cylinders are of the barrel type, cylinder head, intake and exhaust manifolds, also the water jacket, being cast integral. This type of cylinders presents a neat and symmetrical exterior, and from a thermodynamic standpoint offers advantages which result in economy of performance.

The magneto is supported by an auxiliary, utilizing the dual system of ignition. Lubrication is by means of four deep compartments formed in the crankcase into which the connecting rods dip, and provision is made on the caps for the picking up of sufficient oil to produce copious lubrication. The capacity of the lubricating system is three quarts of oil, and a hand pump is provided for replenishing purposes. In the cooling system a vertical tube radiator is employed, and circulation is on the thermo-syphon principle. The clutch is of the cone type, leather-faced, and the leather is held into intimate engagement by means of six plungers actuated by springs. The general appearance of the car is shown in Fig. 1; it is designated as

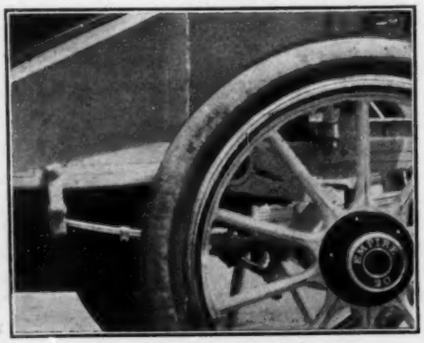


Fig. 4—Part of front suspension, showing details of half-elliptic spring shackle.

Model C Empire; presents a racy appearance, and affords protection to the occupants of the seat due to the considerable overhang of the dash. In this view the cape top is folded back.

Carefully Thought-Out Details

Fig. 2 shows a quick detachable handhole cover on the crankcase, which is fitted to the crankcase plate; the latter is bolted on and may be readily removed if, for any reason, it is desired to have access to the bearings. Fig. 3 shows the three-quarter elliptic springs, and the method of shackling, also the wheel hub, wood work, and large diameter brakedrum. Fig. 4 presents the shackling of the half-elliptic front springs, also shows the front-wheel construction and the shock absorber, together with the method of attaching same. Fig. 6 is a view of the rear axle showing the three-quarter elliptic spring, its mounting on the perch, the fastening of the shock absorber, also the brakedrum, how it is protected from mud accumulations, and other details along engineering lines. Fig. 7 is a view of the driver's side, showing the relation of the seat to the dash, side levers, oil pump, rake of the steering post, and the Prest-O-Lite tank on the running board.

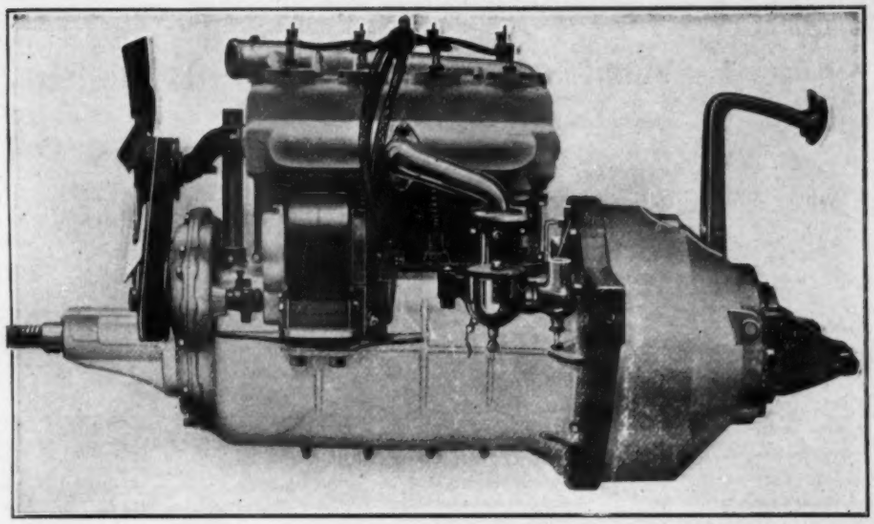


Fig. 5—Side view of self-contained power plant showing magneto and carbureter on left side of the motor

General Characteristics of the Model C Car

The 20-horsepower motor has cylinders 3½ x 4-inch bore and stroke respectively, and in the construction of the car it was the idea to maintain a certain harmony of the relation of the parts to each other, taking into account the maximum possible torque of the motor and the greatest strain which could be brought to bear in a breaking effort. The side frames are of pressed steel, open-hearth stock, 3½ inches deep, with 1½-inch flanges, with a 3¾-inch drop at the rear.

Among the other advances there are questions of refined material, as the crankshaft, which is drop forged of special alloy steel, and thereafter heat treated to impart rigidity and kinetic qualities. The bearings are of Parsons white bronze, and the fitting is done with precision. The camshafts are drop forged in one piece with integral cams; cementing stock is used, and the cam faces are hardened to a sufficient depth to survive in service. The valve dimensions are large, the head being 1¾ inches in the clear, which is half the diameter of the piston. The compression is regulated with a view to utilizing these large diameter valves to advantage, and the torquing performance of the motor is on a constant basis as the speed increases.

Selected second-growth hickory is used in the wheels, which have 10 spokes in front, 12 in rear, with Q. D. rims. The tires are 32 x 3½ inches both front and rear.

The blue body, of sheet metal, semi-torpedo type, with inclosed dash, and cream running gear, is an especially natty combination.

The equipment of the Empire consists of 6½-inch gas lamps with nine-inch flare, brackets included; oil side lamps, tail lamps, horn, complete kit of tools, tire repair kit and tire pump.

The price is $950, f. o. b. Indianapolis. As regards extra equipment—a Racy type top will be fitted for an additional $50; folding glass front, $25; Prest-O-Lite tank, fitted and gas line installed, $20; 60-inch tread (for Southern travel), $20.

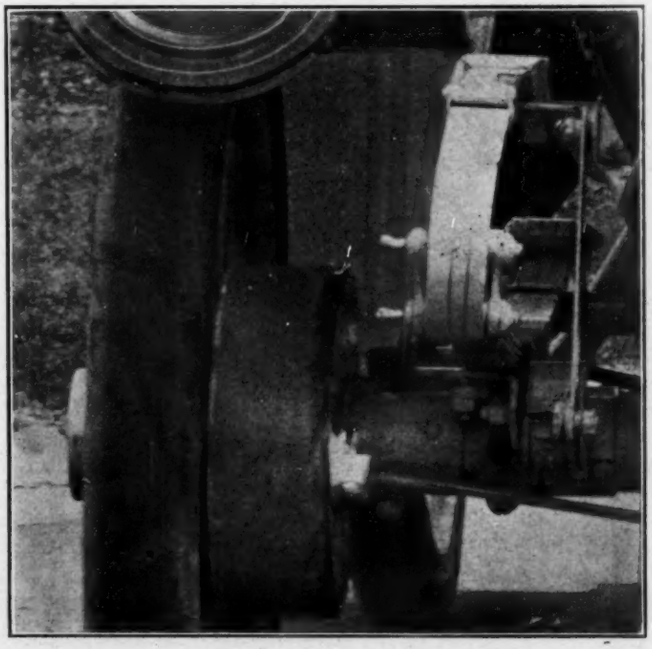


Fig. 6—Rear view of three-quarter-elliptic spring suspension, enclosed brakedrum, and anchorage for spring support

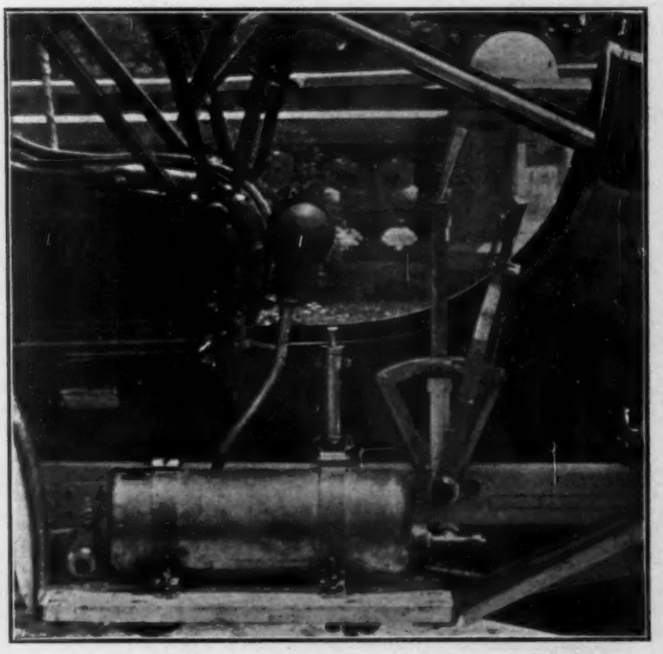


Fig. 7—Side view at left side of seat, presenting side levers and Prest-O-Lite tank on running board

Abstracts from the 50 Best Foreign Papers

Digest Along Technical Lines for the Engineer

Means for operating a motor at high temperatures and without water or air cooling by separating piston stroke from gas expansion——Spring suspension which reduces up and down motion——Common sense in calculation of valve springs——Paris 'bus run with coal gas.

Radical means for avoiding radical cooling of internal combusion motors are suggested by Martin-Saxton, an engineer. The only reason for intensive cooling is the need of lubrication between piston and cylinder, which requires a temperature of less than 300 degrees for the interior cylinder walls. And, for a little matter of lubrication, one encumbers the motor with elaborate apparatus which is liable to get out of order. Moreover, this cooling absorbs 44 per cent. of the heat, 24 by convection and 20 by radiation. It must be gotten rid of. Impossible! No, simplest thing in the world. All that is necessary is to separate the working chamber of the hot gases from the zone of the necessary sliding joint between piston and cylinder. The cylinder *C*, in which the piston plays, is prolonged upward by means of a closed cylinder of slightly larger interior diameter, which is to be the working chamber for the gases and whose walls may be of any material, provided they will resist the pressures, the temperatures and the vibrations. Then, the piston *D* is surmounted with a plunger *B* of an exterior diameter slightly smaller than that of the stroke-cylinder, and of such length that at the top of the stroke it obstructs the gas chamber almost completely and at the bottom of the stroke it masks the stroke portions *C* against the heat from the gas chamber. By this procedure the sliding joint between piston and cylinder is never reached by more gas than that which penetrates through the slight clearance between the plunger and the cylinder walls and receives only an insignificant quantity of heat. Hence the walls don't get hot and lubrication is accomplished without any difficulty. Cooling is dispensed with. In the industrial motors, fuel economy is paramount; the heat losses should be reduced to a mimimum; the walls should be non-conductors. The gas chamber should be coated interiorly and the plunger exteriorly with refractory material. To avoid premature ignition, the explosion type should be abandoned for the type giving relatively slow combustion and expansion of the gases, as by employing separate pumps for the liquid fuel and for the air. (Some trouble may be apprehended in making the fuel reach the gas chamber without disintegration through highly heated pipes and valves.)

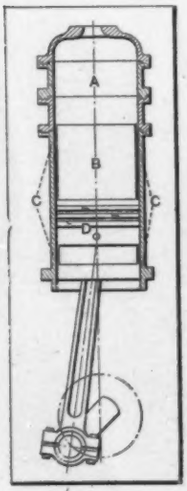


Fig. 1—Martin Saxton Motor

With a light motor, as shown in Fig. 1, fuel economy is secondary, and it should be sufficient to use belts of metallic walls separated by rings of non-conductive material. By having several belts and several rings, the temperature of the ring nearest the stroke portion of the cylinder may theoretically be reduced to less than one-half of the degrees reached in the exhaust gas, even if the insulation rings are supposed to be very thin. To prevent dislocations from expansions and contractions, encasings with limited lateral play are employed.

As in these light motors the walls are metallic, they will radiate exteriorly and will not reach temperatures which will produce premature combustion, hence any type of motor may be used: four-cycle, two-cycle, high or low compression, rapid or slow ignition. To effect a transformation of an ordinary motor, only the combustion chamber need to be changed and a plunger added to the piston. Simple! (The author must have in mind, it seems, the addition to his system of the ordinary air-cooling provisions, if he shall hope to avoid premature ignition.) Valves might get red hot. They, too, should be kept away from contact with the superhot gases. By a special arrangement each valve is masked except at the moment when it functions. This arrangement consists, as shown in the illustration, Fig. 1, in a plate secured to the valve, which, when the latter is closed, almost completely obstructs access from and to the combustion chamber. It is, in fact, a sort of auxiliary valve which does not quite reach its seat. It acts in the same manner as a metallic screen, preventing the inflammation of the gas contained in the valve chamber. Besides, the valve chamber is insulated from the motor by joints of refractory material, and might, if need be, be provided with air-cooling flanges. The system promises a considerable lightening of motors, greater reliability of light motors, greater fuel economy and the removal of troubles with cooling apparatus and cylinder oils.—*La Vie Automobile*, June 11.

A spring suspension system by which much of the motion required of spring action is transformed from vertical motion, which shakes the occupant of the vehicle, into horizontal motion, has been tried in practice in Germany, and is shown in part in the accompanying illustration, Fig. 2. Unfortunately, the elements are omitted which would explain how the recoil of the spring is utilized or disposed of. Apparently the spring, which is suspended from *x* to *y*, must be a combined extension and compression spring mounted, possibly in telescoping tubes, under a tension corresponding to the normal weight of vehicle body and load. The system is mentioned as the Deussen Suspension. By its use the front and rear portions of the automobile frame are both shortened, and the wrought iron shapes which hold the bell levers are riveted to the frame ends. The helical spring is secured, as mentioned, to the upright arms of the bell levers, while the horizontal arms are shackled to the wheel axle in a manner the details of which are as yet withheld from publicity. When the wheel axle is pushed upward by an inequality in the road, the shock is transmitted through the shackles and the horizontal arms, *a—b*, to the bell-lever bolts and the upright arms, *a—c*, the latter spreading and extending the spring. By suitable choice of the lengths of the arms very considerable obstructions may be surmounted with very little raising or lowering of the vehicle body. At the trials it was noticed that very uneven ground produced some horizontal motion of the vehicle body, which was noticeable but not disagreeable to the occupants, while the vertical motion was much smaller than with any combination of leaf springs and pneumatic tires.—G. Wentz in *Der Motorwagen*, June 10.

Calculation of the dimensions and strength of valve springs on the basis of a graphic development of the velocity-curve produced by a given shape of the cam and an acceleration-curve developed from the velocity-curve, formed the difficult subject of a treatise by von Doblhoff, of which mention was recently made in these columns. As slight variations in the temper of valve springs, as well as the preferences of the designer with regard to cam shapes, would cover a considerable range, the treatise seemed to illustrate a design method remarkable for its refinement more than for its necessity. Hubert Schimpf, another German engineer, has taken up the gauntlet, however, and by analysis of his colleague's work finds errors in the graphical developments, and he designs a new acceleration-curve, from which he then proceeds to draw inferences with regard to what

constitutes the most favorable form for cams, with a view to using springs of the smallest practicable tension as well as the other considerations relating to the timing of valve action. He arrives at the conclusion which empiric designers had already adopted, that neither the cam shape nor the strength of the springs, which depends upon the cam shape, may be calculated without a compromise between the requirements. In other words, a rapid and definite valve lift will involve a strong spring and increased wear of parts, while a noiseless valve action cannot be realized without sacrifice in the form of a more or less dragging valve lift and valve closing.—*Der Motorwagen*, June 10.

Among the many motor 'buses offered to the Paris General Omnibus Company is one that employs neither gasoline, alcohol nor benzol as fuel. The Cazes, produced by a firm having made a specialty of stationary and kerosene motors, has its own coal-gas producing plant, and consumes low grade coal gas as fuel. In accordance with the new requirements of the Paris municipality, it is a single deck omnibus with first and second-class places and a rear entrance on which two passengers can be carried. The motor is forward, under a bonnet, unlike the present vehicles, which have their power plants under the driver's feet. Special attention has been paid to suspension and the abolition of vibration, and with this object in view the 'bus is mounted on long semi-elliptic springs, and in addition has pneumatic shock absorbers attached to the forward dumb irons and linked up to the front axle just below the spring clips by means of a rod. This is contrary to usual practice, in which the springs have been connected up direct to the shock absorbers. The front springs, too, are shackled at their forward end in a manner first introduced by the De Dion Bouton Company. Although the 'bus is being used as a demonstration vehicle with the hope of convincing the company of its superiority over all other makes, the manufacturers have very little to say about its distinctive features. They declare that its gas-producing plant, carried by the side of the driver, allows this vehicle to be run at a fuel cost of 9 cents a kilometer, compared with 55 cents for a similar vehicle employing gasoline. In comparing such figures it is necessary to take into account the fact that gasoline in France costs from 38 to 40 cents a gallon, and that there is in addition a tax of practically 18 cents on all that is consumed in the city of Paris. Under such conditions the operating company is closely concerned in finding an economical substitute for gasoline, and it is here that the Cazes Company believe they have an advantage.

The mechanical features of the omnibus are four separate cylinders, water cooled by pump circulation, and only differing from the standard gasoline motor by the nature of the intake piping. Ignition is by high tension magneto. A cone clutch is employed, a four-speed gear box is fitted, and final drive is taken to the rear axle by side chains contained in oil-tight metal cases.—W. F. Bradley.

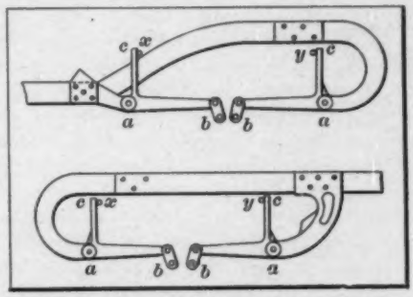
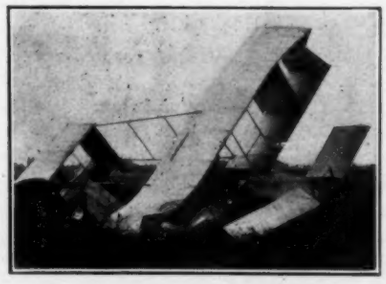


Fig. 2—Diagram of Deussen Suspension

It rests with automobile engineers to supply the scientific methods which may be required in the development of motor travel through the atmosphere, since the engineering talent specifically engaged in aviation is too busy with the fundamental problem to pay much attention to refinements not directly connected with design. The haphazard planning of aviation meets without reference to the science of meteorology, which might safeguard the success of these trials and exhibitions, grates on the trained sense which loves to fit means to ends with some accuracy. And, on the other hand, it has already been proven that the science of the weather has much to gain by applying itself and its resources, heretofore largely restricted to the laboratory, to the very definite determinations and forecasts which aviators will so greatly appreciate. Among the first cares is the devising of really suitable instruments for measuring the velocity of the wind at various altitudes. At the recent meet at Lyons the assistance of André, the director of the Lyons Observatory, was secured, and weather reports announcing atmospheric movements from the surrounding territory were received twice a day, and ingenious instruments were erected, one of which indicated the velocity of the wind by sound signals. A description of the instruments is supplied.—*Revue de l'Automobile Club du Rhône.*

Studies in Aviation Theory and Practice

By MARIUS C. KRARUP



STABILITY for aeroplanes, as has been shown in previous installments, is one of the two principal elements which must be materialized in aeroplane design in order to secure and maintain equilibrium, the other being control of the relative positions of the supporting planes through the actions of the aviator. An excess of stability would render control impossible or impracticable. For example, if stability sets up a resistance of 100 pounds against a deviation of 70 degrees from the normal horizontal poise of the machine, a control action meant to cause such a deviation would be required to overcome this resistance of 100 pounds, before it could become effective. If the deviation were to be accomplished in one second, as might easily be required for safety in avoiding collision with another aeroplane, treetops or any other obstruction, the effort of overcoming the resistance would have to be concentrated in the same short period, and this would tax the aviator too heavily. Laterally the stability can perhaps be allowed to be more pronounced, because centrifugality will help the aviator to produce the canting of the machine, which is necessary for holding one's course at a turn in horizontal direction. And departures from lateral horizontally is not otherwise required for travel. These simple considerations show at once that the stability which is secured by locating the center of gravity far below the planes may be bought too dearly. When inertia enters as a factor, as at starts, stops, retardations and accelerations, a very low location of the center of gravity may even actually contribute to loss of equilibrium, as the weighty bottom portions will tend to swing around the more resistant and lighter areas, or the reverse. Stability, as distinguished from equilibrium by control, evidently differs greatly from the same property in boats. It may not be built into the aeroplane in any desired degree, but consists at its best in a certain proportionateness between the weight distribution and the area distribution, and must be figured out and tried out in practice with due regard to all the various things which can happen to an aeroplane, with motor going and with motor stalled, with headwind, sidewind and wind from below or above. It must be proportioned with some reference to the muscular efforts which an aviator can apply and with some reference, too, to the range of control action which the aviator has at his command. The accompanying vignette, for example, tends strongly to prove that lateral stability is much too weakly developed in the ordinary biplane, in which the means for preserving lateral equilibrium by control action

do not exist except in slight degree in connection with steering. In the Voisin biplane, shown in the reproduction, the lateral equilibrium is further endangered by the vertical partitions characteristic of this type, while the concentration of weight in the central part of the machine, it is believed, also minimizes the resistance to teetering of the structure.

An objection to this view has been offered to the effect that, even if weights were distributed more evenly along the level of the lower plane, as in the Wright machine, one-half of this weight would be tipped down while the other half was tipped up, and that the result, so far as the lateral balance is concerned, should be the same as with the weight all in the center. In a recent discussion on this point it was brought out, against this construction, that the machine is normally speeding forward and the planes are exerting a considerable pressure downwardly against a stratum of air which is condensed or formed into eddies, while the atmosphere above the planes is correspondingly or at least in some degree rarefied. Also, that there is seldom question of an absolutely one-sided impulsion from the wind. If a gust tends to lift one side of the machine, it will practically always also tend to lift the other side, though with less force. Finally, that the planes intrinsically offer less resistance against upward motion than against downward motion, owing to their shape. In the balancing of the forces acting to upset the machine laterally, the turning axis will therefore not be in the longitudinal axis of the machine, but nearer to the end farthest from the disturbing force, and weight will have to be lifted, not only turned around an axis. As these considerations seem to suggest themselves in connection with the subject, they are here mentioned, but, figuring the matter out with a diagram, only the last argument seems to maintain its force, and it only because the designer who places all weighty portions in the middle is practically compelled to place some of them higher than the floor of the lower plane and higher than he would be enabled to place them by using more "floor space," and as a result the center of gravity is therefore almost of necessity higher in the machine whose working parts are concentrated in the middle than in another in which these parts are spread more widely apart laterally. The important point seems to be that there can be no valid objection to the spreading of the weights, and that the accidents frequently befalling aeroplanes, as instanced in the illustration, seem to indicate that additional stability is required, at least so long as the means for preserving lateral equilibrium by control action are almost wholly lacking, and that one of the methods for securing increased stability consists in lowering the center of gravity, by spreading these parts out more than is usually done, while yet keeping the working parts inside of the general contours of the machine.

But it must be remembered, of course, that lowering of the center of gravity is less unobjectionable for the fore-and-aft equilibrium than for the lateral balance, and it may possibly be found that better means exist for avoiding lateral falls. Among the available means to this end, and relating to stability rather than to control, are pointed wings (planes), wings turned up at the ends and wings with elastic portions which ride easy over the "bumps in the air."

As equilibrium must depend upon a compromise between burdensome control and clumsy stability, and stability can probably not be obtained, in whatever degree shall finally be found desirable, without some sacrifice of sustentation, it is scarcely possible to do more than to mention the factors involved and the expedients at command, while the trained judgment of each individual designer, which must after all be supreme in matters which are beyond all quantitative figuring, must decide how much to concede to a low center of gravity, how much to pointed wings or wings at an angle or to the provision of resilient surfaces. As generalities, even when unavoidable, make irksome reading, the writer proposes to prevent drawings in a subsequent issue of an aeroplane in which his individual judgment on the subject, as well as the other connected subjects relating to sustentation, control, propulsion and materials, is exemplified.

In connection with lateral stability in the aeroplanes of current design, a matter relating to the maintenance of lateral balance may here be mentioned, though it relates to control rather than to built-in, automatic stability against lateral disturbance. For obviating a lateral fall the present day aviator depends almost wholly on speed, which is a control factor, but the adroit ones among the aviators, when threatened with a fall to the right, turn to the right—like a bicycle rider does under similar circumstances—without using the steering rudder, however. That is, they warp the planes or turn the winglets (ailerons). By this action increased sustentation is produced on the side to which the machine is tipping, and less sustentation is at the same time produced on the opposite side. But it seems that the warp system has a considerable advantage over the winglet system with regard to the aviator's chance for saving himself by this means, for, while the winglets produce a certain amount of action, they do not affect the action of the main planes, which remains as the large constant in which the small variant loses much of its proportionate effect. Structurally an aeroplane built with the warp system should, therefore, have the superior lateral equilibrium, while in automatic stability the two types are about equal, neither of them having any adequate provisions, the stationary vertical planes with which they may be equipped having a steadying effect only in calm weather and within the range of security which is produced by speed, and depends upon this factor.

How far true stability depends upon the location of the center of gravity, and how far and in what manner it depends upon the location of the areas and their slant or direction, remains the principal question for discussion.

In the automatic stability of aeroplanes the following factors are involved: Weight, area, direction of areas, center of gravity or distribution of weight, distribution of areas, shapes of areas, propulsive force, location of the propulsive force (including its direction) and, finally, the largest and most disturbing factor, the wind, coming, as it may, from all imaginable directions, and varying in power in the most unforeseeable manner. In general, gravitation makes weighty portions lead in the earthward direction and makes the area portions trail above, provided these area portions are not turned on edge, but continue to offer a greater air resistance to the downward movement than the weighty portions. Momentum, which is a product of the propulsive force and the weight, makes weighty portions lead in the momentary direction of motion, and makes area portions trail. Propulsion divides air resistances equally around the axis of propulsion; that is, any plane vertical upon the axis divides the total air resistance against propulsion in equal halves. The wind makes area portions lead in the wind's direction, and the weighty portions trail, but may attack one part of the structure in one direction and another part at a different angle, and its peculiar action upon planes which are held obliquely to the wind's direction as well as all the modifications of the direction of its thrusts, as due to the shapes and angles of incidence of the areas which it attacks, must, of course, be considered. In designing an aeroplane so as to produce automatic stability, to whatever extent is practicable, all the factors and forces just referred to must be reconciled. Whether the machine is propelled by its power, or is gliding by gravitation, or is halted in its progress by a sudden wind, there must be a certain amount of progressive resistance against deviation from that poise of the machine in the atmosphere, which means safety. The only simplifying element in this maze seems to be the fortunate circumstance that the large movements of the atmosphere, which carry the machine out of its course, perhaps, with relation to things on fixed earth, need only be figured on in so far as they are resisted by the propulsive force, or by the gravitation utilized for propulsion in gliding. A few diagrams will illustrate the proportions and shapes which serve automatic stability, constantly with reference to the idea, however, that this property may be realized in aeroplanes only in limited degree, as absolute stability would defeat the purpose of the machine as a vehicle for transportation.

Rejuvenating the Old Automobile

By G. J. MERCER

Illustrating a modern fore-door type of body as it would appear on a Locomobile "Thirty" automobile, giving all information required by a body maker, and showing how the car will appear when completed. In this case the side levers are disposed of so that the sliding gear lever comes inside and the emergency brake lever falls to the outside.

PROCEEDING along the lines as laid down for the previous efforts in this direction, the old body is utilized in the new undertaking, and the fore-door is designed so as to conform to the general appearance of the body as a whole. Fig. 13 shows how the body will look when it is rebuilt, and the shape of the overhang of the dash in order that it will join with the door post, making a workmanlike and artistic job. Fig. 14 is a detail of the fore-door on the entrance side with dotted lines which will be serviceable to the body maker, and Fig. 15 shows the disposition of the side levers, and the modification which will have to be made to accommodate them, while Fig. 16 is a plan of the new work.

Glancing at Fig. 15, it will be observed that the quadrant comes low enough to permit of bringing the gear level inside, it being perfectly straight as shown in the dotted lines, but the emergency brake lever comes to the outside, and while it is straight for its whole distance, it is bent sharply at a point just above the quadrant, and the handle is far enough out so that the operator, when he grasps the same, will have room for the hand without scraping against the head of the door. In the construction of this body, a bent ash pillar *A* in one piece forms the framing around the door at the back and bottom, this piece terminates at *B*. It is fitted to the front of the seat and fastened to the same with screws, reinforced by plates or straps. A sufficient offset is given to compensate between the distance across the underbody and that at the bottom of the seat.

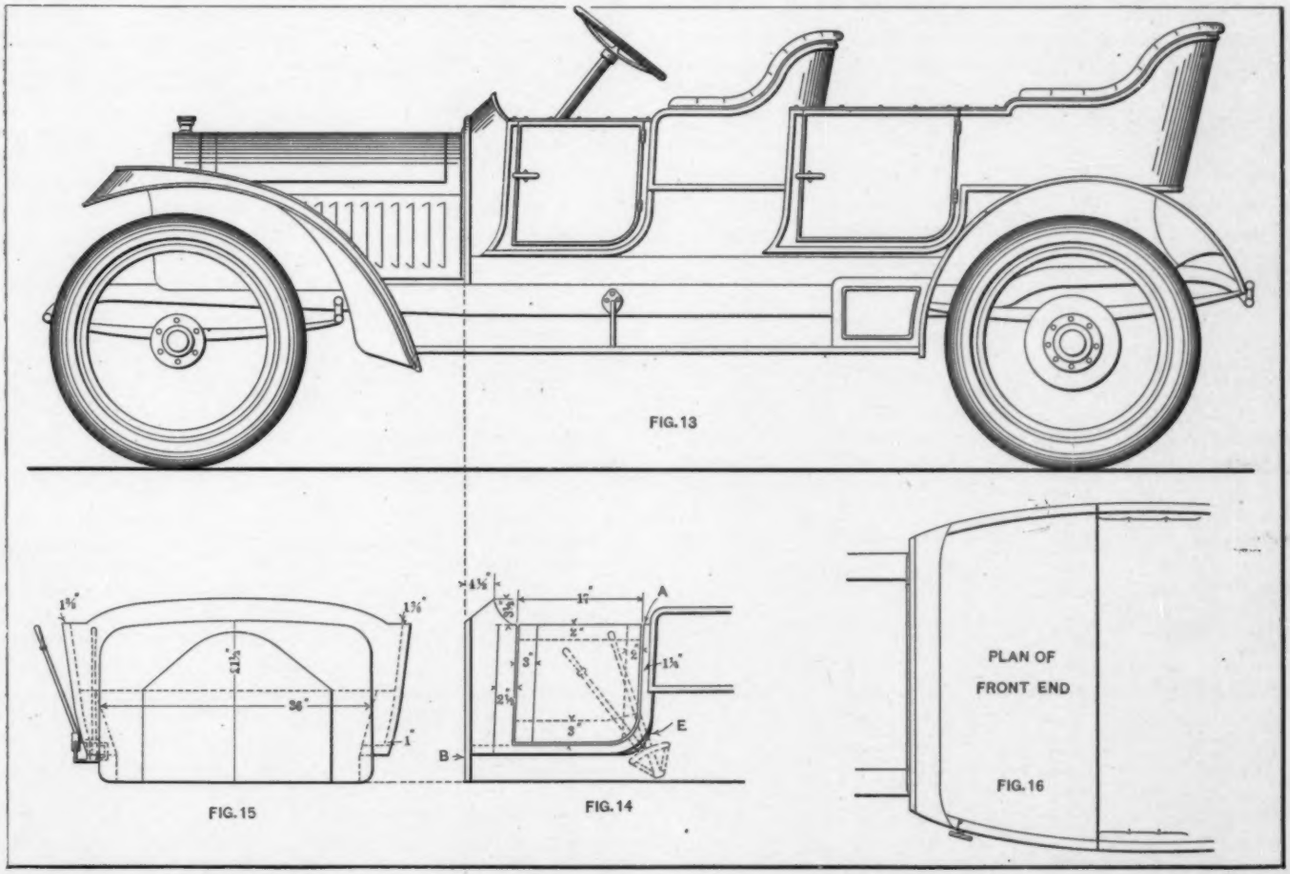


Fig. 13—Fore-door appearance of the Locomobile "Thirty" when the old body is changed over. Fig. 14—Detail of the new fore-door work. Fig. 15—Front elevation. Fig. 16—Plan

Forced Lubrication—Trend in English Practice

By R. K. MORCOM

(Fifth Installment)

CONCLUDING this paper on forced lubrication, tabulations of a statistical character are offered in order to show the methods in vogue in many of the best examples of foreign makes of automobiles, giving such detailed information as will permit the interested reader to judge for himself as to the practices abroad when reference is had to this important phase of automobile engineering. The conclusion is that lubrication is of the first importance, to be sure of a continuity of performance of the automobile from day to day, but also to influence in favor of a low cost of maintenance and a long life.

STATISTICAL TABLE SHOWING THE LUBRICATION METHODS IN

Name of Car	Adams	Ariel	Argyll	Alldays	Austin	Albion	B. S. A.
H.P.	16	31	15.8	10/12, 14/18, 20/25	15	16 and 24/30	15/20
Lubrication System	Forced feed, constant level	Forced	Forced	Forced	Forced	Albion patent	Dip with constant level
Type of Pump	Gear pump	Gear	Gear	Rotary	Vane	Albion patent mechanical lubricator	Gear
Size of Pump	1/16 in. by 7/8 in. 16 pitch	10 teeth 8 pitch 1¼-in. face				Measured quantity forced to each bearing	½ gallon p.m.
Size of Suction and Delivery	3/16-in. delivery Other ducts drilled in crank case	9-32	5-16-in. bore	3/8-in.	¼-in.		5-16 in.
Sight Feed or Pressure Gauge	Positive forced tell-tale indicator on dash	Gauge	Gauge	Gauge	Gauge		Sight feed
Particulars of Filter	Gauze cylindrical	Filtered thrice— (1) Pocket filter (2) Barrel filter (3) Surface filter	Gauze filter above sump	Gauze filter near bottom of crank case	Inside reservoir	Strainer at filling plug	Gauze cup between pump and sump
Relief Valve	Automatic	Automatic	Adjustable from dashboard	Automatic	Adjustable		
Working Pressure	2–3 lbs. sq. in.	5 lbs. sq. in.	10 lbs. sq. in.	8 lbs. sq in.	2–5 lbs. sq. in.		
Speed of Engine	1,500	1,000	1,000	1,000	900	1,000	1,400
Speed of Pump	½ engine	625	500	½ engine	700	6	½ engine
Pump Drive	Spiral gears from cam shaft	Spiral gears from cam shaft	Cross shaft and worm gear from cam shaft	Skew gears	Spiral gear	By ratchet from worm gear or engine	By cam shaft
Position of Pump	Bolted to side of sump	Top of crank case	Front left-hand corner of crank case	Outside of bottom of crank case	Central, outside reservoir	In lubricator	On cam shaft
Oil Reservoir	Sump	Sump	Sump	Sump	Separate reservoir		Sump
Oil — Flash Point	Vacuum A	Price's Motorine C	320 deg.–350 deg.	Price's heavy engine	213 deg. F.	Vacuum A	170 deg. C.
Oil — Viscosity	Vacuum A	Price's Motorine C	212 deg. F. / 70 deg. F. = 1 = 25	Price's heavy engine	367.6 at 15.5 deg. C.	Vacuum A	9.7 at 50 deg. C. Water = 1
Oil — Consumption						800 m.p.g. on 16 600 m.p.g. on 24	1,000 m.p.g.

Name of Car	Metallurgique	Motobloc	N. E. C.	Napier	Panhard	Renault	Rover
H.P.	18	14/16	20, 30, 40	45	18–30	14–20	15
Lubrication System	Forced	Gravity	Mixed	Forced	Panhard patent	Gravity	Gravity
Type of Pump	Gear	(Alternative)	Plunge pump to crank shaft Vane pump for circulation	Gear	Panhard patent	Centrifugal	Vane
Size of Pump		1-10 litre		80 g.p.h. at 600 r.p.m.	Very small		1 quart p.m.
Size of Suction and Delivery	⅜ in.	1.5 and 2.0 cm.			⅜ in.	½ in.	3-16 in.
Sight Feed or Pressure Gauge	Pressure gauge	Sight feed	Drip feed to cylinders on pressure system	Pressure gauge		Sight feed	Sight feed
Particulars of Filter	Gauze filter in bottom of sump	On dashboard	Seven gauzes	Gauze cylinder	Gauze filter on return vent to oil tank	In centre of radiator	30 mesh gauze in sump
Relief Valve	Automatic and Adjustable			Automatic and Adjustable	Automatic		
Working pressure	2 lbs.		Slight	10 lbs. sq. in.			
Speed of Engine	1,500	1,200/2,200		1,200	900	1,100	1,000
Speed of Pump	750	½ engine	Engine speed	600	450	½ engine	500
Pump Drive	Skew gears from cam shaft	Eccentric off cam shaft		Skew gear off cam shaft	Off end of exhaust cam shaft	Off cam shaft	Bevel gear
Position of Pump	Back of engine bottom of sump	Dashboard		Back end alongside sump	Between fly-wheel and crank case	In crank chamber	Below front end crank chamber
Oil Reservoir	Sump	Tank	Filter tank	Sump	Oil tank	Sump	Sump
Oil — Flash Point		Vacuum A		620 deg. F.			
Oil — Viscosity		Vacuum A					
Oil — Consumption	1,500 m.p.g.	150/200 m.p.g.	500 m.p.g.			500 m.p.g.	600 m.p.g.

VOGUE IN MANY OF THE BEST MAKES OF FOREIGN AUTOMOBILES

Crossley	Charron	Deasy	De Dion	Daimler	Lanchester	Lancia	Minerva
15.6	15.6	14 and 18	9 to 35	15, 22, 33, 38 and 57	28	20 and 24	26
Forced	Gravity	Mechanical	De Dion forced feed	Semi-mechanical	Forced	Forced	Combined splash and pressure
Gear	Gear	Gear	Gear	Gear	Gear	Gear	Gear
Two 1¼-in. gears, ⅝ wide	.....	.....	.....	1½ g.p.m.	2–⅞-in. gear wheels, 2-in. long, 12 teeth in each	.....	1¼-in. wheels
5-16 in.	⅜ in.	.....	.....	3/8 delivery	Suction, 4–¼-in. holes. Delivery, 1–5-16 in., 2–¼-in., & 1–3-16 in. bore.	Suction, ⅜ in. Main delivery, ⅝ in. M. B., 3-16 in Gudgeons, 1-16 in.	¼ in.
.....	Sight feed	Sight feed 14 Pressure gauge 18	Pressure gauge	.....	Tell-tale	Pressure gauge	Pressure gauge
Gauze filter in sump	In oil tank	Gauze filter in sump	Gauze covering sump	Gauze in base chamber and drilled plate in pump	Over bottom of pump	In sump	Grill full length of crank case
Adjustable	.....	.....	Automatic and adjustable	.....	.....	Automatic	.....
10 lbs. sq. in.	.....	.....	.....	.....	40 lbs. sq. in.	15/17 lbs. sq. in.	.....
Up to 2,500	750–1,500	1,000	1,500	1,400	2,000	1,000/1,600	1,800
½ engine	½ engine	.....	.....	1,000	4,000	½ engine	900
Direct off cam shaft	Direct off cam shaft	Gear off cam shaft	Parallel drive from cam shaft	Spiral gears from eccentric shaft	Gear wheels from crank shaft	Off cam shaft	Shaft connected to ½ time shaft
Front corner, over ½ time wheel	End of cam shaft	In sump	Inside ½ time gear	In engine base chamber	Bottom of crank chamber	Rim end cam shaft	Outside crank case lower half
Sump	Oil tank	Sump	Sump	Sump	Engine base	Sump	Sump
Price's H	402 deg. F.	Vacuum A	.....	.....	.....	520 deg. F.	.....
Price's H	980 at 60 deg. F. 39 at 250 deg. F.	Vacuum A	.....	.....	.....	75 secs. at 210 deg. F	.....
500–800 m.p.g	200–300 m.p.g	.....	.....	.....	.....	700 m.p.g.	.....

Rolls-Royce	Sunbeam	Singer	Sheffield-Simplex	Talbot	Vauxhall	Valveless	Wolseley
40/50	12/16	16/20	45	12, 15, 20, 25 and 35	20	22	Various
Forced	Forced	Forced	Semi-mechanical	Mechanical	Forced	Forced	Forced
Gear	Gear	Gear	Gear	Plunger	Plunger	Vertical Plunger and distributor diaphragm	Gear
.....	.....	.....	6 g.p. min.	15 m/m dia.	¾-in. diameter ½-in. stroke	5-16-in. bore 3-16-in. stroke	.....
½ in.	¼ in. outside	⅜ in.	¼ in.	10 m/m	¼-in. bore	¼ in.	⅜ in.
Pressure gauge	Pressure gauge	Pressure gauge	Pressure gauge	Both	Pressure gauge	Pressure gauge	Pressure gauge
Lowest point of sump	Gauze in centre of sump	Bucket shape in top of oil tank, easily removable	Gauze in mouth of sump	Detachable tubular gauze	3½-in. dia. gauze surrounding suction valve	Gauze in tank	Copper gauze in sump
Automatic, can be set to required pressure	Automatic	.....	.....	.....	Automatic and Adjustable	None	None
15 lbs. sq. in.	.....	5 lbs. sq. in.	4 lbs. sq. in.	.....	10/15 lbs. sq. in.	.....	5–20 lbs. sq. in. depending upon speed
1,000	1,000	1,360	1,000	1,100	1,000	1,000	.....
500	500	680	500	550	500	20	Crank shaft speed
Skew gears	Direct from cam shaft	Off exhaust cam shaft through skew gears	By spiral gears from cam shaft	From cam shaft	Eccentric on cam shaft	By worm gear	Spiral gear off cam shaft
Lower portion crank chamber	End of cam shaft	Back end bottom of base chamber	Low down on crank chamber	In sump	Rear end of cam shaft	Front of engine	Side of engine
Sump	Sump	Oil tank	Sump	Sump	Sump	Oil tank	Sump
500 deg. F.	.....	Vacuum A	250 deg. F.	.....	Price's Motorine "C"	470 deg. F.	420 deg. F.
1,130 secs. at 120 deg. F.	.....	Vacuum A	.....	.....	Price's Motorine "C"	50 secs. at 210 deg. F. (Saybolt M/C)	175 at 140 deg. F.
1,000 m.p.g.	.....	700/800 m.p.g	200 m.p.g.	.....	2,000 m.p. 1¾ gal.	1,130 m.p.g.	600 to 1,400 m.p.g.

Lost Motion Denotes Danger to the Autoist

Importance of properly fitting keys discussed; fetching up on a taper requires pressure; taper pins must be free from oil and fit in a reamed hole; some means for preventing levers from floating off shafts discussed; lamps deteriorate if they are not fastened to the brackets in a secure manner and methods are discussed.

LIFE as it relates to an automobile will be long or short, and the cost will accumulate, accordingly as the parts are kept in their proper relation, which involves inspection and adjustment as the occasion requires. The rotative members are protected if they are "booted" and a sufficiency of good lubricant is supplied, remembering, however, that the unctuousness of lubricating oil, when it departs, as it will in service, must be supplanted in a new supply of oil, considering, too, that the residuum (when unctuousness no longer obtains) has all the deteriorating charactertistics of a gummy mass, with a goodly sprinkling of abrasive material intermingled.

Taking it for granted that this phase of the automobile problem will receive its quota of attention, it remains for the autoist to inspect his car at frequent intervals, for the purpose of noting whether or not the linkages and levers are a tight and proper fit with the members to which they relate. Keys, if they are to measure in ability just sufficient to check up with the strength of the shaft after the keyway is cut, have to be quite small. On the other hand, if the keys are relatively large the shaft will be relatively weak. Designers, in view of the problem involved, are disposed to put the limit on the strength of the key, rather than to cut into the reserve strength of the shaft. Considering this wise provision, it is necessary to make sure that the keys are a proper fit, that they bear tightly on their sides and that they do not bear on the metal in the radial plane. In fitting keys, they are given a very slight taper, and when the workman is fully alive to the exigencies of key service he does the final fitting, utilizing Prussian blue and a dead smooth file, refitting sufficiently to make sure that the final driving of the key will fetch it up against the sides with a considerable amount of pressure, avoiding at the same time the damaging of the key, or the spline in which it fits.

If it requires a workman of no mean skill to properly fit a key so that it will stay in place and do its work with certainty, it goes without saying that an unskilled autoist is afforded an excellent opportunity to fail in his attempt to refit a key after it has been in service long enough to show signs of crushing, but it is not to be expected of an old key that it will serve any very good purpose if during inspection the autoist finds that the key is loose and he simply drives it home with a hammer with the expectation that this kind of key-fitting will be a near approximation to the character of the work which is done by a careful workman during the initial effort. When a key works loose in service and shows signs of wear it is time to dispose of it, and it will then be necessary to redress the keyways and fit in a new key. The fitting will have to be done with even greater care than originally, because the faces of the keyway will never be as good as they should be with a new car.

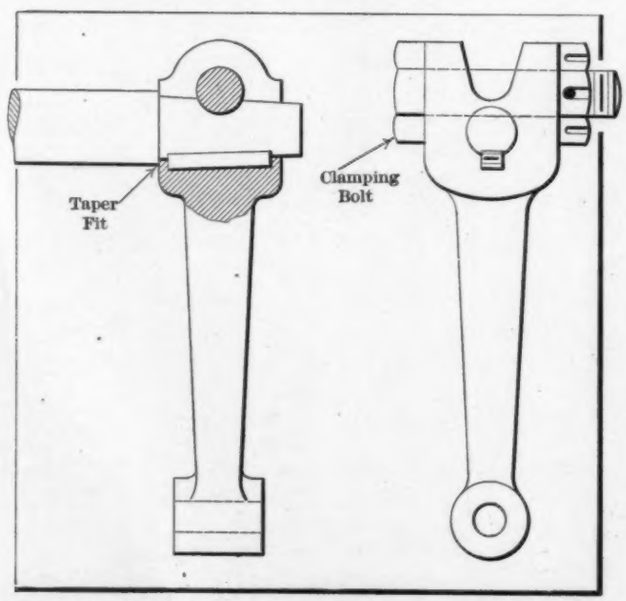


Fig. 1—Showing a lever with a key on a tapered shaft with a clamping bolt and locking nut

One way to maintain a tight relation of the key to its spline is shown in Fig. 1, which is of a lever on the end of a shaft with a taper fit of 3-16 of an inch to the foot, measuring from the center; in addition to the key, the hub of the lever, being split, is provided with a clamping bolt, and the bolt cuts the diameter of the tapered shaft where it passes through. The hub is a neat fit on the shaft, and the key is side-fitted with accuracy. The clamping bolt is then inserted, and the nut is set up until the clamping effect is sufficient for the purpose. The key is imbedded in the hub of the lever and the keyway is cut for the whole distance of the taper, parallel to the axis of the shaft. The clamping bolt has a locking nut, but the autoist must take into account the fact that the bolt will elongate in service, and that the nut ought to be taken up a little from time to time until the initial elongation of the bolt is supplanted by final rigidity.

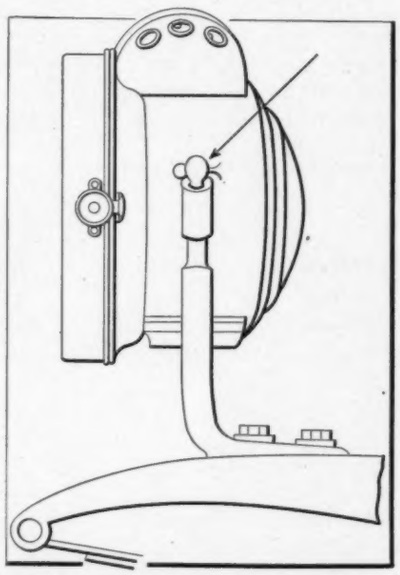


Fig. 2—Cotter pin over the washer on a lamp bracket placed to prevent the lamp from jarring loose

The clamping fit shown in Fig. 1 is on a round (tapered) shaft. In steering post work, however, it is not uncommon to use a square shank on the protruding end of the shaft. This idea is shown in Fig. 4. The square shaft is tapered and this character of fit, considering the four-sided shank, demands more attention than that which must be accorded the round shaft, because the latter may be reduced to its proper diameter by grinding methods. When the square shaft is properly sized, and the hub of the lever, with its broached hole, is "blued" and scraped to a neat fit, the clamping bolt is brought into play in precisely the same way as was described for Fig. 1, but there is just the same difficulty due to the tendency of the bolt to elongate in service, and the only way to overcome it is to take up on the locking nut as the occasion requires. The way to find out if a lever is loose on its shank is to take hold of the lever and see if it has any shake; there should be no sign of lost motion, but it rarely ever transpires that clamping bolts, if they are put under sufficient pressure initially, will continue in service without elongating, so

that the autoist who finds his levers in a shaky condition should not be disappointed, but he is laying the foundation for a respectably sized repair bill if he fails to take action with reasonable promptness.

Fig. 3 shows a lever which is held on the shaft and prevented from rotating by a taper pin. It is a poor idea, nor can it be expected that the taper pin will hold out very long. With trouble of this sort, and it means trouble sooner or later, the average autoist finds himself in a quandary. When the old taper pin gives out he selects a nice, shiny new one, and he drives it into the hole with about the same force that the tup on a spile driver attacks the end of a spile. It is all to no purpose. No matter how much pressure is put on the taper pin it will not stay in place anyway unless the hole is re-reamed, to do which requires the proper use of a sharp reamer of the right size; even then, if the shaft is hardened, nothing good can come of it unless it is annealed before reaming. Finally, if a taper pin is to be regarded as efficacious,

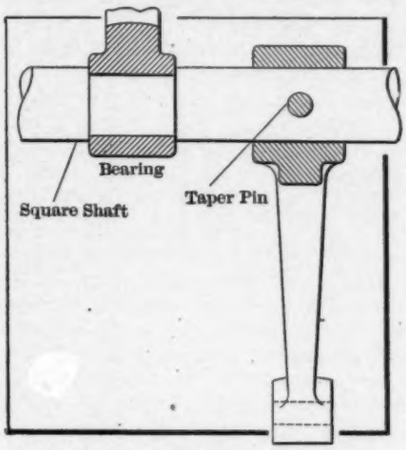


Fig. 3—Taper pin placed to prevent a lever from rotating on the shaft

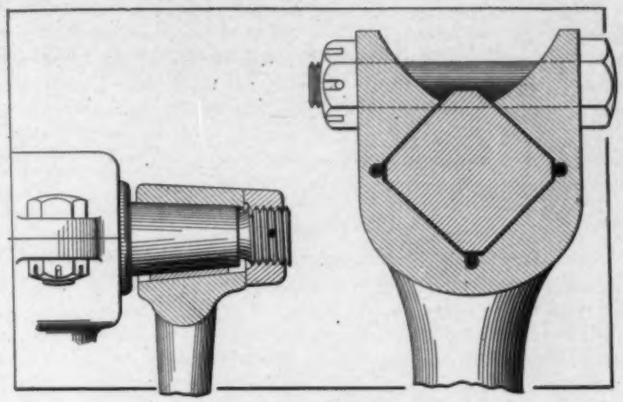


Fig. 4—Square shaft with a broached hole in a clamping lever hub and a bolt with a lock nut for clamping purposes

it must be cleaned thoroughly, removing all traces of oil, before it is inserted in the taper hole or else it will come out again; this is what lubricating oil is for. The walls of the holes serve as a bearing for the pin and if a lubricant is furnished there will be no metal-to-metal contact. In order to have metal-to-metal contact, which is what is wanted to keep a pin in place, the oil must be removed.

Lamps to give satisfaction, even if they are rightly designed, must be so installed that they will stay in place. This is not always the case, and Fig. 2 is used as an example to suggest one of the several ways which may be resorted to in order to hold the lamps in place. The brackets should be of steel and securely bolted to the frame.

Testing Steel—For Impact, Bending, Etc.

By BERTRAM BLOUNT, W. G. KIRKALDY and Capt. H. RIALL SANKEY.

(Third Installment)

Continuing the story of the tests as outlined in the last installment, the authors show the methods by which the tensile, chemical, and tensile-impact tests were carried out, and the results obtained. A diagrammatic sketch of the apparatus designed for the tensile-impact tests will assist the reader to a better understanding of the process.

THE following are some of the points attended to in the matter of selecting the position of test pieces.

When dealing with the steel plates, all test specimens were prepared lengthwise of in the direction of rolling, and it was not deemed necessary for the purposes of this investigation to include tests in the crosswise direction. As far as practicable the small specimens were taken from the same relative position, in order to minimize differences arising from difference in position. It was found impracticable to eliminate altogether effects due to position; for instance, the repeated bend specimens were taken near the skin surface, as would naturally be the case in ordinary workshop practice, and they then did not quite correspond in position with the small impact tensile and small static-tensile specimens, because the provision of suitable heads for holding necessitated the center or body of those specimens being located somewhat further in from the exterior surface.

Again, it should be noted that the standard-sized tensile specimens were made for the purpose of establishing the ordinary test data regarding the various types of steel and not for the purpose of comparison with the small specimens.

Tensile Tests

The tensile tests were carried out in the usual way and the standard test-pieces were made in accordance with the provisions of the British standard specifications. The small test pieces were 0.357 inch diameter with 2-inch gauge length. Mention need only be made as to the determination of the elastic stress. The procedure followed was that observed by the late Mr. David Kirkaldy, who, when commencing his testing operations, adopted the definition for the elastic stress as that where the rate of stretch ceases to be proportional to the load applied. This is determined by observing the rates of extension of the test-piece at regular increments of stress, and wherever the rate of extension increases the load is then noted.

As a matter of interest for this communication, the yield point, as evidenced by the drop of the steelyard of the testing machine, has been added; but Mr. Kirkaldy desires to point out that the practice at his testing laboratory has been steadfastly to combat the recognition of the "yield point." It is not

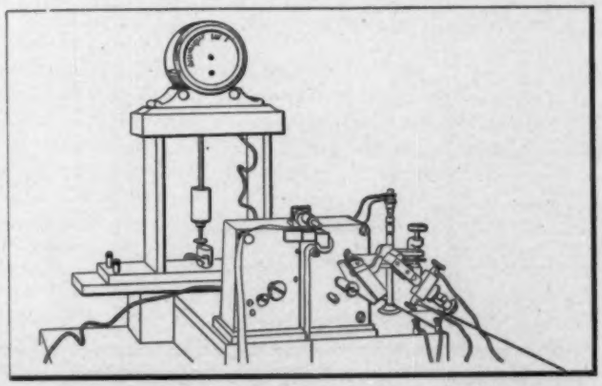


Fig. 4—Time recorder with half-second pendulum clock

a reliable criterion of the elastic limit, and he thinks that it ought to be discouraged. It is ouly during very recent years that he has been constrained to include this "yield point" in his official reports owing to the pressure put upon him by engineers insisting upon having it; as a *modus vivendi* he has therefore included it in his reports where wanted; but it has even then always been in conjunction with the determination of what he deems to be the elastic stress.

Chemical Tests

The following is a short description of the methods adopted for making the chemical tests which were carried out in Mr. Bertram Blount's laboratory:

Carbon, silicon, sulphur, phosphorus and manganese were determined in all the specimens, and in addition chromium and nickel in the specimen of high tensile steel intended for automobile parts. The methods of analysis employed were those usually accepted by steel chemists, and it is sufficient to indicate briefly which of the several methods recognized as reliable were preferred.

Carbon was determined by dissolution of the steel in potassium cupric chloride, its collection on asbestos in a tube closed with a perforated platinum cap and combustion in a quartz tube in a stream of purified air (not oxygen), the gases being passed over heated copper oxide.

Silicon, sulphur and phosphorus were determined by the methods given by Blair without modification.

Manganese was determined by Rothe's method, depending on the solubility of ferric chloride in ether for removing the bulk of the iron, followed by a basic acetate separation.

Nickel was estimated by a method depending on the formation of a double cyanide of nickel and potassium incompetent to dissolve silver iodide. A gravimetric method was also employed, consisting in removing the bulk of the iron as in the Rothe process, separating the manganese as dioxide and precipitating the nickel as sulphide in acetic acid solution, the small quantities of nickel remaining associated with the iron and manganese being separated by a basic acetate precipitation in the usual manner.

Chromium was determined by fusion of the product of the dissolution of the steel with sodium carbonate and potassium carbonate, the operation being repeated and the chromium reduced from its solution as chromate, and weighed as Cr_2O_3.

Tensile Tests

The general principles on which the machine used for these tests has been designed were referred to in the first installment. Fig. 2 gives a diagrammatic elevation of the machine and Figs. 3 and 4, Plate 1, some of its details. The anvil consists of a couple of castings weighing 400 pounds each, and securely bolted to four upright H-section steel columns, which in turn are bedded in concrete. The joint between the castings and the steel columns was machined and carefully fitted; the effective weight is 2,000 pounds and in this way an adequate mass has been given to the anvil. The edges of the casting are protected at the place where the blow from the tup has to be received by hard steel strips carefully bedded and securely bolted to the casting.

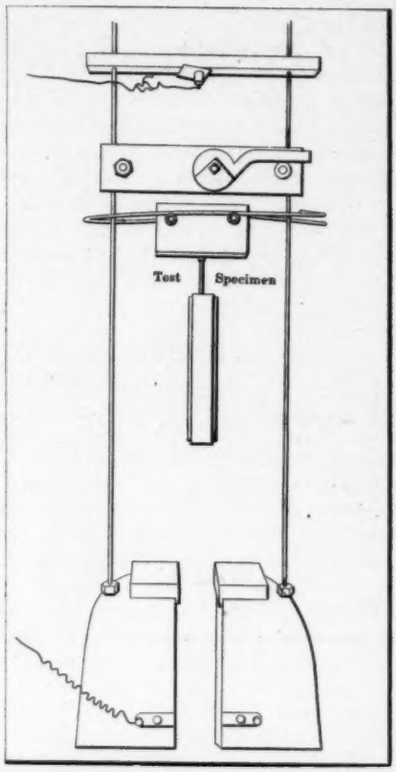


Fig. 3—Details of impact-tensile testing machine

The test piece connects together the "tup" and the arresting crosshead, the lower grip being fixed to the tup and the upper one to the crosshead, as shown in Figs. 2 and 3, and special care was taken in designing the ends of the test-pieces and the grip so that the line of pull would sensibly pass through the axis of the test-piece. The combination of crosshead, test-piece and tup is allowed to fall freely, there being no contact between the crosshead and the two wires shown in Fig. 2 on this page, and it will be seen that when the crosshead strikes the anvil its motion is suddenly arrested, but that none of its energy is communicated to the test-piece. The energy in the tup is, however, exerted on the test-piece and ruptures it, and with a given height of fall the weight of the tup is so chosen that there will be an energy excess to insure breaking the test-piece with one blow.

A stretcher is fixed to the two wires illustrated in Fig. 3, at any height desired, so that by connecting the crosshead to it any desired fall of the tup can be arranged for up to 40 feet. The connection of the crosshead to the stretcher is made by a suitable releasing catch. This catch is so arranged that the crosshead and the tup are instantaneously released without imparting any side motion to them—a more difficult thing to do than might at first sight appear. The tup was so designed that additional side pieces can be added to it. The smallest weight weighs 10 pounds and it can be increased to 20 pounds by steps of 2 pounds.

The energy applied to the test-piece at the moment of rupture can be accurately calculated from the height of fall, since it is a free fall, and as already stated the measurement of the remaining energy is determined from the velocity the tup has immediately after rupture. This measurement is made by observing the time interval between the breaking of two electric contacts, one placed immediately after rupturing the test-piece and the second 10 feet lower down. The energy absorbed by the breaking of the specimen is then determined.

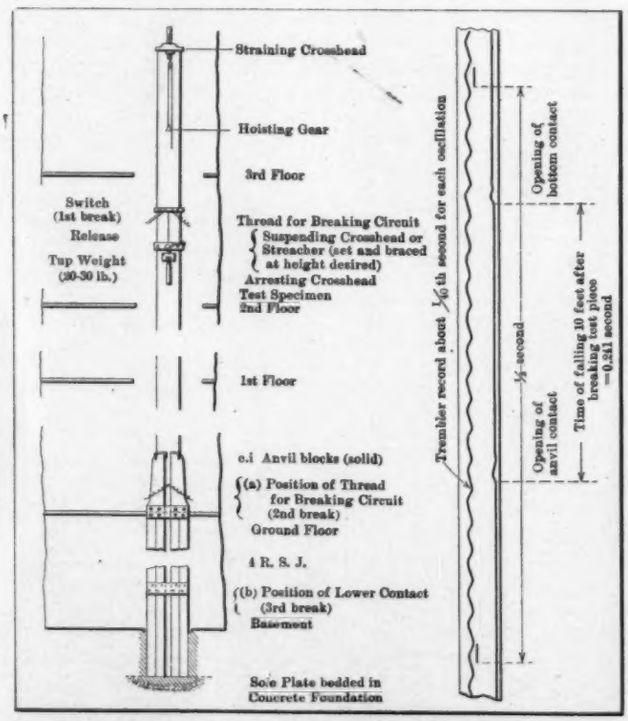

Straining Crosshead
Hoisting Gear
3rd Floor
Switch (1st break)
Release
Tup Weight (20-30 lb.)
Thread for Breaking Circuit
Suspending Crosshead or Streacher (set and braced at height desired)
Arresting Crosshead
Test Specimen
2nd Floor
1st Floor
c.i Anvil blocks (solid)
(a) Position of Thread for Breaking Circuit (2nd break)
Ground Floor
4 R. S. J.
(b) Position of Lower Contact (3rd break)
Basement
Sole Plate bedded in Concrete Foundation
Trembler record about 1/40 th second for each oscillation
Opening of bottom contact
1/5 second
Opening of anvil contact
Time of falling 10 feet after breaking test piece = 0.241 second

Fig. 2—Diagram of apparatus designed for impact-tensile tests

Fig. 5—Reproduction of record from time recorder

Questions That Arise—General in Scope

Best way to locate cracks in cylinders; how to take automobile gasoline off of wearing apparel; reagents used in testing storage batteries; variations of the depression around carbureter nozzles; effect of such variations; functions of the intake manifold from the carbureter point of view; facility offered by tortuous passageways in the process of vaporization.

[152]—What is the best way to locate a crack in a cylinder if it is barely, if at all, discernible, especially if it is desired to determine how extended it is?

Moisten the surface of the metal with kerosene all around the suspected surface; rub off the oil and then chalk it over; the oil in the crack will exude and discolor the chalk; in this way the crack may be traced.

[153]—Would it not be good to know how to remove grease and other accumulations which are so prone to attack one's garments, especially when a repair by the roadside must be undertaken, and no provision is made for suitable overgarments of an appropriate character?

An old duster will protect the roadside repair man's clothing; if none is at hand and grease does find its way onto the garments, the cleaning process to employ depends upon the character of the cloth in the garment to be cleaned.

How to Clean Garments of Automobile Oil and Grease

Cotton cloth: rub with lard, then apply soap, in quantity to saponify the lard. Wash alternately with water and turpentine.

Woolen cloth: same as for cotton cloth.

Linen cloth: apply soap, or oil of turpentine, alternating with a stream of water under some pressure.

Silk fabric: apply lard, then soap, after which wash with benzine and water alternately; let the water fall from a height, or use a stream under some pressure.

Caution: Before proceeding to clean a delicate fabric, it will be a good precaution to try the process out on a sample of the same material, with a view to noting if there is some peculiarity of the fabric that will resist cleaning—it might be made worse.

[154]—What is the relation of nitrogen to oxygen in atmospheric air, under a pressure of one atmosphere, and at a temperature of 60 degrees Fahrenheit?

(*a*) To find the quantity of nitrogen, by volume, in atmospheric air, corresponding to one volume of oxygen, proceed as follows:

$$N = O \times 3.770992 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

(*b*) To find the quantity of oxygen, by volume, corresponding to one volume of nitrogen, proceed as follows:

$$O = N \times 0.265182 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Volume changes with temperature; which must be considered.

[155]—What list of re-agents is used in storage battery work?

REAGENTS USED IN TESTING ELECTRIC STORAGE BATTERIES

Formula.	Reagents. Name.	To Make Solution, Proceed as Below.
$Ag\ N\ O_3$	Nitrate of silver.	1 part salt, 20 parts water, in orange colored bottle.
$K_3\ Fe\ Cy_6$	Potassium ferrocyanide, Red prussiate of potassium.	1 part salt, 12 parts water.
$K_4\ Fe\ Cy_6$	Potassium ferrocyanide, Yellow prussiate of potassium.	1 part salt, 12 parts water.
$N\ H_3$	Aqua ammonia, Ammonia water.	Purchase 16 degs. B., in glass-stoppered bottle.
$K\ O\ H$	Liquor potassæ.	Purchase ready for use, green glass bottle.
$Ca\ H_2\ O_2$	Hydrate of calcium and water, Lime water.	½ grain of lime to 1 oz. of water.
$K\ I$	Iodide of potassium.	1 part salt to 20 parts water.
$H_2\ S\ O_4$	Concentrated sulphuric acid.	Purchase 66 degs. B. sulphuric acid.
Cu	Copper filings.	Purchase test copper.
$Fe\ S\ O_4\ 7\ Aq$	Green vitriol, Proto-sulphate of iron.	1 part salt, 8 parts water.
Au	Gold leaf.	Purchase as required.
$H\ Cl$	Muriatic acid, Hydrochloric acid.	Purchase concentrated acid in glass-stoppered bottle.
$Sn\ Cl_2$	Proto-chloride of tin.	1 part salt, 10 parts water.

[156]—What is the depression around the nozzle in the average carbureter as measured in ounces?

In view of the marked effect it has on the power of a motor, it should be maintained at the lowest possible limit. It is frequently estimated to be about 8 ounces per square inch. It has been found to exceed 32 ounces (2 pounds) per square inch.

[157]—What is the function of this depression?

The gasoline raises to near the opening of the nozzle, and the force which induces it to spray out is represented in the depression. This depression is below the atmosphere so that it is what is normally described as a partial vacuum. The difference between the pressure of the atmosphere and the depression (vacuum) represents the force which moves the gasoline out of the nozzle, more or less as a spray, into the air current as it is induced by displacement of the piston of the motor where the gasoline is taken up and more or less vaporized as it mingles with the inrushing air, thus producing the fuel mixture for the motor.

[158]—To what extent is vaporization attained around the nozzle?

It is probably true that vaporization starts at the instant the spray of gasoline is picked up by the air, and the intensity of this action depends upon the extent to which the pressure is lowered.

[159]—What are the influences for complete vaporization?

If the vaaporized gasoline is in spherical formation, or approximately so, the smaller the spheroids are, the more efficacious the result will be. Since vaporization is only possible if enough heat is delivered to the gasoline vapor to equal its latent heat of evaporation, it follows that there must be enough heat in the inrushing air to accomplish this end, but the spheroids must be small enough and offer sufficient surface, so that the heat transfer can be accomplished within the time available.

[160]—Does the length of the intake manifold affect this situation?

Since it is highly improbable that the gasoline, as it is sucked out of the nozzle, is in minutely subdivided particles, it follows that the heat-laden air will be retarded in the intermingling process and much more time is required in the process of vaporization than that available if the manifold is of small diameter and short. In view of these facts it is not out of place to consider that the manifold is but a part of the carbureter, and that it should be long enough to serve for the purpose of giving enough time to permit the air to give up its heat to the gasoline to form vapor. In other words, the intake manifold performs the function of a mixer.

[161]—Since the mixture will travel fast if the area of the manifold is restricted, why not make the manifold of large area, and in this way add to the period of time without having to add to the length of the manifold for the purpose of affording the requisite time to complete vaporization?

It is true that the larger area would afford its measure of compensation, but designers are debarred from resorting to this means for the reason that the rate of flame travel in the mixture must be below the rate of travel of the mixture, or, when the inlet valves open, flame from the combustion chamber will fire the inrushing mixture and will travel down to the carbureter, thus making what is commonly termed "popping in the carbureter."

[162]—Is it possible to prevent "popping in the carbureter" by designing the intake manifold with this end in view?

If the area of the intake manifold is sufficiently restricted, popping in the carbureter will be avoided, even though a spark plug be placed in the intake manifold and a spark applied, if the timing of the spark is such as to induce it after the intake valve opens.

What Side of the Road Should an Auto Take?

Editor THE AUTOMOBILE:

[2,317]—Will you please answer the following questions: When an auto driver wishes to pass a horse and buggy going the same way, which side of the road should the auto take? Under such circumstances, does the Ohio State Law oblige the driver of the horse to give the auto one-third of the road? A. E. E.

Lodi, Ohio.

When an automobile driver wishes to drive his car by a vehicle ahead, it is his duty to see that the road ahead is clear and pass the approaching vehicle on its left side. The law, whether or not there is a specific expression, is so construed that carelessness or recklessness must not be indulged in. Even if the law should provide for an allowance of one-third of the road for a horse-drawn vehicle, it does not necessarily follow that an automobile driver would be safe in passing the horse-drawn vehicle, either at a high speed or in such a way as to scare the horse; it would still be necessary to exercise "due caution."

Trouble is Tappet Rod Sticks

Editor THE AUTOMOBILE:

[2,318]—I have a two-cylinder motor of the opposed type, and it runs along very nicely excepting on occasions when the motor suddenly shuts down. I have gone over the timing, ignition system, carbureter, and pretty much everything, but the mysterious trouble above noted is still in the car. SUBSCRIBER.

Buffalo, N. Y.

Referring to Fig. 1, you will observe that the valve stem is offset from the tappet rod, and it is very likely that the guides are somewhat worn. The pressure comes on out of a straight line, and a certain amount of heat causes the lubricant in the guides to gum up. Your trouble, under the circumstances, is due to the sticking of the tappet rod, and you will be able to overcome it by using a stouter spring on the valve or hooking an auxiliary spring into an eye in the foot of the tappet head so that it will snap back and hug the face of the cam all the time instead of staying open, as shown.

Piston Rings Are Worn; Lost Compression

Editor THE AUTOMOBILE:

[2,319]—I have a two-cycle motor which works to my satisfaction for a part of the time; at other times I fail to get any good out of it at all, and I judge from indications that the compression is almost nil. W. A. L.

Harrisburg, Pa.

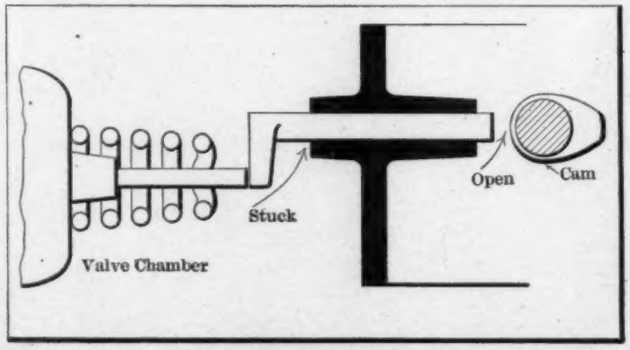


Fig. 1—Depicting offset tappet and showing how it sticks if it is not lubricated

You will probably find that the piston rings are of stout section and lack flexibility. The ports are also wide, and as the rings sweep over the ports they tend to fall in; the result is that the corners of the rings are worn over the diameters which sweep the ports, and not being pinned, they float so that there is no compensation between them. A new set of well-made rings should help you out, although the remedy will be but partial if the cylinder bore is out of true. Regrinding the cylinders would be the further remedy. Fig. 2 is offered as a rough illustration of the idea here presented.

Supply the Right Amount of Good Oil

Editor THE AUTOMOBILE:

[2,320]—My motor smokes every time I put oil in the crankcase, and continues to do so for upward of a half hour after I start out. The rough sketch enclosed shows how the oil is carried in the lower half of the crankbox, and the trouble is that I do not know when I put in enough oil; being afraid of lubricating trouble I am inclined to use an excess, but how am I to do otherwise with safety?

Wheeling, Va. READER.

Taking the liberty to revise your sketch as shown in Fig. 3, it is with the idea of putting a standpipe on the end of the drain cocks, which standpipe should be high enough so that it will project upwards within the case just the amount which will fix the desired oil level, so that the scoops on the ends of the connecting rods will dip into the oil each time they cross the bottom dwell point. Alongside of the drain cocks plugs are placed, one for each chamber, for the purpose of draining all the oil out of the wells at intervals in order that the quality of the lubricant may be kept up to a reasonable standard. It will be readily understood that after oil is put into the crankcase, if the drain-cocks are open, the excess of oil will drain out, leaving the exact right amount for working purposes.

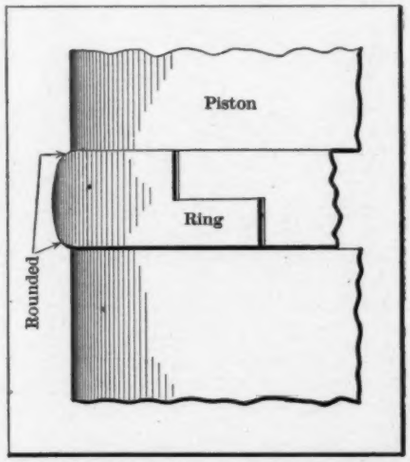


Fig. 2—Showing rounded corners of the piston rings due to the rigidity of design and wide ports

Turning Over Speed in Miles Per Hour

Editor The AUTOMOBILE:

[2,321]—I am much interested in your discussions in relation to the operation of automobiles, and I judge from talks which I have had with other beginners like myself that the question of safety on a curve is one which might be profitably exploited, and it ought to be of some assistance were one to know something of the border line of safety. Can you enlighten readers of "The Automobile" on this subject? K. A. C.

Bowling Green, Ky.

No two makes of automobiles perform precisely alike in this respect. Much depends upon the distribution of weight on the four wheels, and upon the center of gravity of the car as a whole. Assuming that the distribution is equal on the four wheels, and that the center of gravity is approximately in the plane of the axles, the curve, as shown in Fig. 4, will serve for the purpose. In this curve the turning arc is given in feet, as ordinates at the bottom of the chart, and the speeds at which the car will capsize are given as abscissa.

Discussion of Carbon Cracking Phenomenon

Editor THE AUTOMOBILE:

[2,322]—In your reply to letter No. 2,304, you mention free carbon as a second cause of sooting. I wonder if you are not perpetuating an error in this matter. I have experimented a great deal with oils since first driving an automobile and my experience goes to indicate that the presence of free carbon is a good sign rather than a bad one. This is so contrary to the accepted belief that some explanation is necessary. I early decided that the hotter the engine could be run the greater would be the economy, and possibly the power, and the less the radiating complications. The hot engine necessitates a high-test oil, and a hot engine will "crack" the fuel or oil much more rapidly than a cool one and, therefore, will soot up or carbonize more rapidly than a cool engine unless the heat is up to a still higher point where the carbon burns as it should and disappears. My water-cooled engines were not as hot as this but were hot enough to carbonize quickly.

My experience was, therefore, as follows: The low-test oil cracked, smoked, and sooted rapidly. The high-test oils remained on the cylinder walls and did not need to be fed in such a large amount. The low-test oils could be clear, almost white, and, therefore, probably free from "free carbon." The high-test oils were darker in color, which was quite manifestly due to "free carbon." When one takes a clear oil and mixes lamp-black with it to make it look like the darker oil, he is surprised at the small amount of lamp-black needed to effect the coloring. So small is the actual weight of black that it seems negligible. But the thought for your readers to keep in mind is that all mineral oil is a composition of

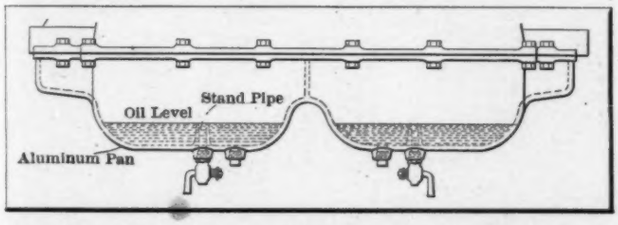


Fig. 3—Oil wells in the lower half of the case and method suggested to maintain the proper level

hydrogen and carbon; that the large proportion of carbon is what adds the lubricating ability, and that the larger the proportion of combined carbon the better the lubricating ability generally; that gasolene and kerosene contain enough combined carbon to soot an engine quickly if "cracked," or separated, as they may readily try by turning the carbureter needle to get too much fuel and form a black smoke; that only as much fuel and oil should be used as the air will burn; that burning oil makes a very slow flame, and so yields very little power; that an excess of oil uses air which should be used by a proper amount of gasolene; that less of a high test oil will serve better than more of a low test oil; that the high test oil does not burn nor crack, as does the lower test oil. (This is readily proven by noting that an excess of gasolene makes a black smoke, whereas an excess of oil usually makes a blue vapor.)

From the above I trust it will be seen that the other portions of your answers are correct, and that free carbon, instead of being an objectionable feature, may be evidence of a good oil, and therefore is not to be avoided.

The other thought in this connection is that engines may be run so hot as to burn the carbon deposits; carbon is simply fuel in solid form. That "red particle" of carbon which is supposed to cause preignition will burn and disappear if given sufficient free air for its combustion. If it does not get red enough to burn it does not get red enough to pre-ignite. The great trouble is that the driver, in striving to get maximum power, will feed all the fuel the air will take, and there is no free air left to burn this free carbon. The remedy for this is to use larger engines and have the gasolene needle where it can be reached so that when full power is not needed the mixture may be lean with plenty of free air. This not only burns the carbon but is economical and avoids odor.

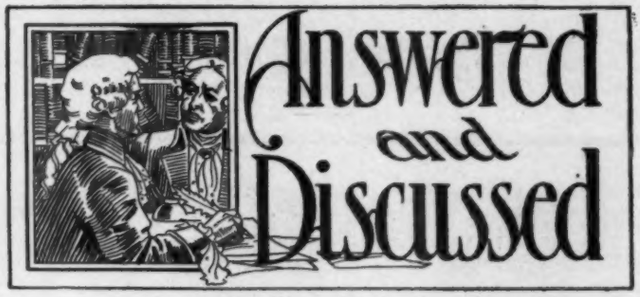
CHAS. E. DURYEA.

Reading, Pa.

Temperature Must Favor the Boiling Point

Editor THE AUTOMOBILE:

[2,323]—Your reply to letter No. 2,309 indicates that you believe the temperature of the motor is an essential condition in spark starting. I am sure this is wrong. Gasoline will vaporize at ordinary temperatures and so will make an explosive mixture in the cylinder even when the engine is cool. The only requirements, then, are to have the piston where it can receive an impulse effectively and to have a mixture of proper quality, hot or cold, and to make a



spark. If the engine is to start when cold the cylinder oil must be very thin, so the engine can turn easily. The mixture should be overfat. When the engine stops the hot walls will expand the charge and force out some of it past the rings; then, as the engine cools, pure air will be drawn in. If the charge is of proper economic proportions this air will reduce it so it will have but little power, but if overfat in the first place, the addition of air will make it more powerful, and taking out the spark plugs may be an advantage. From the above it will be seen that spark starting is not in line with economy, and, therefore, not to be considered as an unclouded good.

Your comments on the loss of heat in the air-cooled engine (page 1,138, issue June 23) seem to me incorrect. By using graphite for lubricant, and alcohol for fuel, it is possible to make an engine that need not be cooled worth mentioning; such an engine radiates the wall heat into the new charge and this heat is not lost. I use this simply as an illustration to show that the hotter the walls of an engine the less the heat loss. In the paper in question we must assume that the walls receive a fixed quantity of heat per impulse. To maintain the outer surface at 100 degrees centigrade requires a large amount of radiator surface for two reasons; the amount of heat to be dissipated is greater and the ability of the radiator is less, but if the walls can be worked at 200 degrees centigrade they will radiate more heat back into the new charges, and lose less by outward radiation; second, the radiating subgtance, being hotter, will part with its heat to the air doubly fast, and so need not have so large a surface. This is plainly shown by my experience with air-cooled engines having copper spines. Although of the 2-cycle type, they keep workably cool without the use of a fan, because the copper both carries the heat out quickly and parts with it to the air rapidly. There is a most noticeable difference in two engines of same size, one having cast-iron flanges, and the other having copper spines. The cast-iron flanges will be so cool one can feel them with the hand, without getting burned, but the copper spines will be sizzling hot, yet the iron cylinder will be overheated on a hard pull, while the copper spined one will be in fine working order.

CHAS. E. DURYEA.

Reading, Pa.

The temperature of boiling of automobile gasoline is all that is necessary—it may be low.

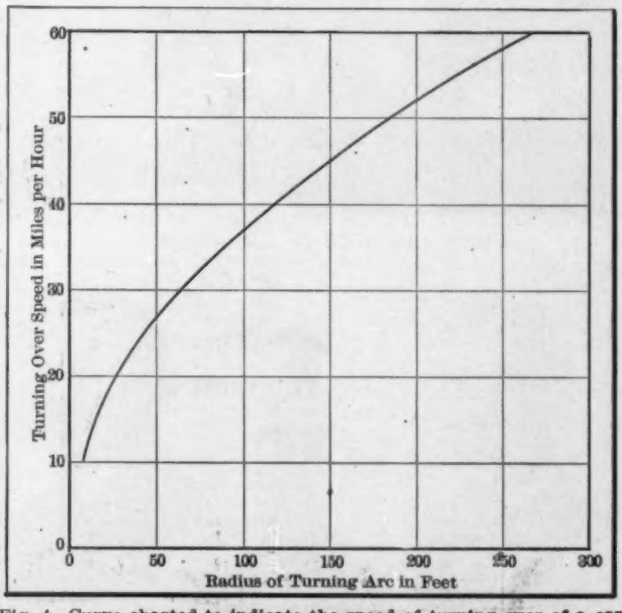
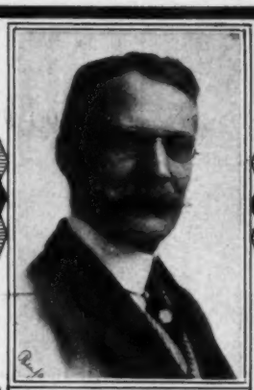


Fig. 4—Curve charted to indicate the speed of turning over of a car on a curve

Makes Motoring Pleasant: A. C. of Cincinnati

Dr A. B. Heyl



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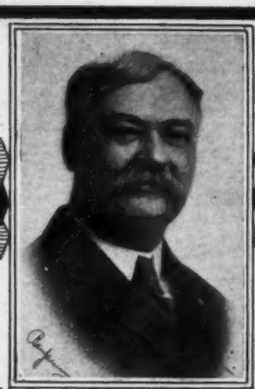

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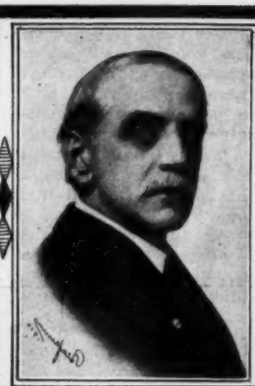
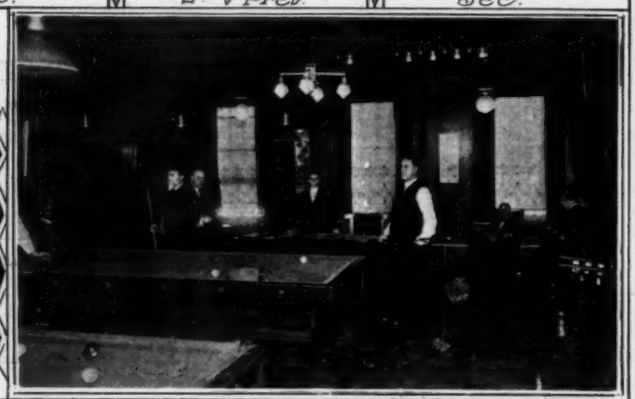


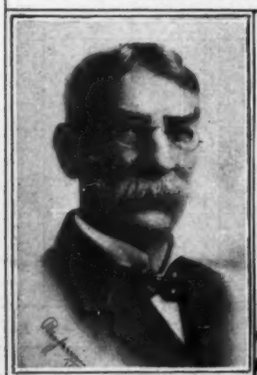
Dr L. S. Colter
Sec.

Well Equipped Office

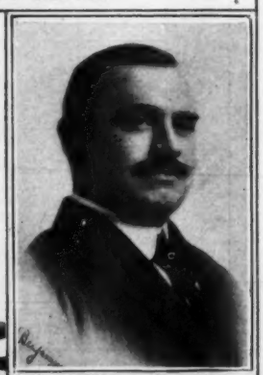


Billiard and Pool Room

The Dining Room



E. J. Carpenter



L. J. Merkel

CINCINNATI, July 4—Reared upon the foundation principle of making the use of the automobile more pleasant to the residents of Cincinnati, the Automobile Club of Cincinnati has grown mightily; waxed strong in numbers and powerful in influence. Still in its infancy, measured in terms of time, the club has over 800 active members, each of whom is the owner of an automobile and an enthusiastic subscriber to the platform of the organization.

Like kindred bodies all over the country, the Automobile Club of Cincinnati is composed in large measure of the best and most influential citizens of its community. The roster of the club reads like a selected list of the leaders of the Ohio metropolis in all prominent lines of endeavor.

The club has been in existence only about two years in its present form, but it is accounted one of the important factors in the life of the city. No great project of a civic character is undertaken without consideration by the automobile club, owing to the fact that members of the motor organization are leaders in practically all the civic organizations of Cincinnati.

While the declaration of principles of the club contains only a single statement, its scope is so broad that every possible line of activity is included within its terms and the way the members attack the various problems touching upon the "rendering pleasant of the use of the automobile," is refreshing.

Without being in any sense a sporting organization, the club takes part in a wider program of sports than many clubs that are ostensibly devoted to that branch of motoring. The Tours and Runs Committee is one of the busiest subdivisions of the club and while a large part of its work is informal, nevertheless, it is particularly useful and efficient.

It is not a social organization, despite the fact that many of the leaders of Cincinnati's exclusive society belong among the membership.

It is not a political organization in any view, even though Cincinnatians are all politicians and the city is the home of the President and of the most prominent candidate to succeed Mr. Taft in that exalted office. Both Taft and Governor Harmon are enthusiastic automobilists and both are indirectly connected with the automobile club.

Tourists who have visited Cincinnati this season are impressed with the work of the club long before they reach the city. For miles around, practically every crossroad is decorated with signs showing directions and distances. Such a thing as police persecution may be said to be unknown and Col. Paul M. Milliken, Chief of Police, co-operates heartily with the club to protect motordom from injustice, while the club responds by firmly squelching any tendency on the part of the motorists to break the law. Mulct laws, either State or municipal, are nipped in the bud in a way that might seem mysterious if one did not understand the work of the Automobile Club of Cincinnati.

The Queen City is built like Rome, on seven hills, each of which presents a distinct problem to the owner of an automobile. It possesses much wealth and social prestige and as a consequence the proportional ownership of automobiles is very high. The city streets, drives and boulevards have a national reputation and the surrounding roads are excellent in the main. As a result, the pleasure of automobiling is splendidly augmented by natural conditions and with surprising speed the art of man is being applied to them. This work, directly or indirectly, may be laid at the door of the Automobile Club of Cincinnati, which is elaborately housed in the Gibson House, in Walnut street.

The club is managed by a Board of Governors consisting of fifteen members. The present board is composed of President Charles L. Bonifield, one of the leading surgeons of the United States; first vice-president, D. McKim Cook; second vice-president, G. W. Drach; secretary, Dr. L. S. Colter; treasurer, Louis J. Merkel; consulting engineer, E. J. Carpenter, and the directors, Dr. G. M. Allen, J. P. Orr, George W. Cleveland, William Perin, Dr. A. B. Heyl, Dr. C. C. Fihe, A. P. Streitman, E A. Conkling, Carl F. Streit and Charles W. Ireland.

These gentlemen represent the front rank in the vanguard of Cincinnati's progress along all lines of advancement. Finance, the professions and business interests of all kinds are included and the members who do not hold office are quite as prominent as those who do.

When any undertaking of the club needs to be financed the organization does not have to conduct street fairs or go begging. It dips into its own well-lined pocket and supplies the motive power. It holds monthly meetings and the President frequently calls special meetings of the membership, but the bulk of the club's work is done in committee-room. The difference between the operation of the club and some others is that "it gets action on everything it undertakes."

That does not mean that every project submitted to it is forced through successfully, but it does mean that the pigeonhole is not overworked.

In general way the activities of the club may be summed up under the following heads: First, in the erection of signboards throughout the territory over which the club presides; second, in the registration of chauffeurs; third, in favorable publicity; fourth, in controlling speeders and potential lawbreakers; fifth, in scrutinizing legislation; sixth, in boosting its membership; seventh, in conducting such functions as the annual outing of the orphans; eighth, in presenting entertainments that really entertain; ninth, in promoting sociability, and tenth, in insisting, quietly, effectively or truculently as the case may be, upon a square deal for the motorist.

These ten principles, all depending upon the first and greatest aim, that of "rendering the use of the automobile more pleasant," are only slightly different from the avowed purposes of nearly every other club in the land. The real difference lies in the way they are enforced and made effective.

Dr. A. B. Heyl, one of the directors of the club, is also secretary of the Ohio State Automobile Association and makes the Cincinnati Club his headquarters. This is a big advantage to the prestige of the club and a convenience to touring motorists. There is more independent action among Ohio motordom than there is in a big majority of similar State organizations. This is shown in numberless ways, but is particularly emphasized in the legislative situation.

A great motor speedway is being projected across the river from Cincinnati, and when the course is built and ready it will be only natural that the Automobile Club of Cincinnati will take a more prominent part in the sporting end of the work than it does at present. As it is, the club declines to be identified with race meetings that are founded upon the simple effort to gain dollars. As a matter of fact the money-making features of motoring do not appeal very strongly to the organization.

Coming Events in the Automobiling World

Jan. 7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.
Jan. 16-21, 1911..New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Jan. 28-Feb. 4, '11..Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc. Pleasure Cars and Accessories Exclusively.
Feb. 6-Feb. 11, '11..Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc. Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.

Races, Hill-Climbs, Etc.

July 1-10.....Los Angeles, Cal., Road Carnival of Licensed Dealers.
July 8-9.....Grand Circuit Meet, Churchill Downs, Louisville, Ky.
July 9.....Hill Climb, Morison, Col.
July 9.....Plainfield, N. J., Hill Climb of Plainfield Automobile Club.
July, Middle of...Richfield Springs, N. Y., Hill Climb.
July, Middle of...Grand Rapids, Mich., Road Race of Grand Rapids Automobile Club.
July 16-18.....Motor Contest Association Tour to Catskill and Hill Climb Up Kaaterskill Clove.
July 18-23.....Milwaukee, Wis., Tour of Wisconsin State Automobile Association for Milwaukee Sentinel Trophy.
July 28-30.....Detroit, Mich., Summer Meeting Society of Automobile Engineers.
July 30.....Wildwood, N. J., North Wildwood Automobile Club, Speedway Races and Club Run.
Aug. 1.....Minneapolis, Minn., Reliability Run of Minneapolis Automobile Club.
Aug. 3-5.....Galveston, Tex., Beach Races, Galveston Automobile Club.
Aug. 4.....Algonquin, Ill., Annual Hill Climb of Chicago Motor Club.
Aug. 15.....Start of Munsey Tour.
Aug. 17.....Cheyenne, Wyo., Track Meet.
Aug. 31.....Minnesota State Automobile Association's Reliability Run.
Sept. 2-5.....Indianapolis, Ind., Speedway Meet.
Sept. 3-5.....Wildwood, N. J., Reliability Run and Speedway Labor Day Race Meet of North Wildwood Automobile Club.
Sept. 5.....Wildwood, N. J., Track Meet.
Sept. 5.....Cheyenne, Wyo., Track Meet.
Sept. 5.....Denver, Col., Road Race, Denver Motor Club.
Sept. 5.....Los Angeles, Cal., Speedway Meet.
Sept. 5-10.....Minneapolis, Minn., Track Meet at State Fair.
Sept. 9-10.....Providence, R. I., Track Meet.
Sept. 10.....Los Angeles, Cal., Mount Baldy Road Race.
Sept. 10-12.....Seattle Wash., Race Meet.
Sept. 17.....Syracuse, N. Y., Track Meet of Automobile Club of Syracuse, Syracuse Automobile Dealers' Association and the New York State Fair Association.
Sept.....Chicago, Commercial Car Reliability Contest of Chicago Automobile Club.
Oct. 1.....Long Island Motor Parkway, Vanderbilt Cup Race, Wheatley and Massapequa Sweepstakes.
Oct. 3.....Louisville, Ky., Reliability Run, Louisville Automobile Club.
Oct. 6-8.....Santa Anna, Cal., Track Meet.
Oct. 7-8.....Los Angeles, Cal., Speedway Meet.
Oct. 8.....Philadelphia, Fairmount Park Race, Quaker City Motor Club.
Oct. 15.....Long Island Motor Parkway, Grand Prize, Automobile Club of America.

THE AUTOMOBILE

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LAST of the Glidden Tours is here, so it is claimed by those who make a point of prognosticating.

* * *

AERONAUTICAL performances, of which there are now plenty, tell a many-sided story; practicability is pictured in the whole situation. Some men claim that "Drednaughts" are no longer worth the price of metal it takes to build them, counting the value of the metal on a "scrap" basis. The main part of the story of the utility of the aeroplane is entirely overlooked; the great Western plains, with thousands of square miles of level country, alive with herds of cattle, running over with sheep, growing in agricultural importance, must be the near-future land of the "plane."

* * *

THE herdsman, with his "plane" will be able to do more and better work; it will cost him less than in the old way; he will be able to protect his cattle as he never could before, and the influences on the cost of beef will be so great that humanity will take very kindly to the "winged steed."

* * *

LOST motion, as it creeps into machinery, starting with the watch, passing through the reaper, locomotive, and no less in the automobile, represents the effect of time and service in the machines that are well cared for assuming that they are properly made. If good material is not used, or assuming that the character of the workmanship is poor, the extent of lost motion is more or less independent of time, and belongs in the land of speculation.

* * *

LUBRICATION, if it is properly cared for, if the good lubricant reaches the areas that are under pressure and the influence of relative motion as well, will do more to stave off old age than any other influence. Present practice abroad is given a measure of attention in THE AUTOMOBILE this week, and, while it may not be necessary for American designers to look about, the fact remains that it is not bad practice to keep abreast of the doings of others.

* * *

WHILE foreign technical papers pay rather too much attention to "sporting events" to suit the average American engineer, the fact remains that, of the 53 papers of this complexion which "go to press" regularly, some of them are up to a high standard, and the "abstracts" which appear weekly in THE AUTOMOBILE are culled for the purpose of affording to the American engineer a clear insight into the doings abroad, as they are depicted in the more reliable of these foreign papers.

* * *

INDIANAPOLIS has its Speedway events at sufficiently frequent intervals to keep before the public the fact that American-made automobiles are up to the scratch. It may not be generally appreciated that the hardest service that can be put upon an automobile is that due to speed. Weight is a factor, but this influence is only in direct proportion from the life-of-the-automobile point of view. Speed influences the life of a car quite differently; life is inversely proportional to the square of the speed. The Indianapolis Speedway is doing a great service for the automobile; it affords the speeding conditions necessary to bring out the staying qualities of the cars as no other test would do. Makers appreciate this fact and they owe much to the pioneers who had the hardihood to build the speedway.

* * *

STANDARDIZATION is a condition that cannot be present in automobiles unless it is first induced into the materials of which the automobiles are made. It is the purpose of the Society of Automobile Engineers to work on the material question until it succeeds in establishing a set of standards. The "Mechanical Branch" of the A. L. A. M., made good progress with this question, but inactivity for a couple of years has introduced "The frog in the well" plan which does not wholly solve the problem—bull-dog tenacity is the new idea.

* * *

BETWEEN the acts whipped into shape by the legislative "axe grinders" there are other features for the automobile to support. The latest idea was advanced by the men who champion the Long Island railroad in its campaign of extermination. It is now claimed that autoists, being more numerous than trains, should be required to protect the railroads by having "flagmen" at the grade crossings to warn trainmen.

S. A. E. Takes Lead in Standardization Work

HOWARD E. COFFIN, President of the Society of Automobile Engineers, states that the below copied letters, by H. S. White, of the Detroit Seamless Steel Tubes Company, and G. E. Merryweather, of the Motch and Merryweather Machine Company, hit the nail as squarely on the head as do any of the other communications which have been received by the society.

Seamless steel tubing is being worked upon to reduce the number of sizes specified in every-day work; standard for square holes to be decided upon; broaches for square holes to be limited in number; valve-seat reamer angles will have attention; uniform standards for materials and tools will pay dividends; limits of tolerance to be defined.

Up to the present time there has been an utter lack, upon the part of the engineers affiliated with the motor car, the accessories, or the raw material trades, of any general effort toward uniformity in the specifications of motor-car materials. This work cannot longer be neglected. It is of the most vital importance to the purchasing department, to the engineering department and to the business management of every concern whose interests are in any way connected with the motor-car industry.

The Society of Automobile Engineers is the only organization in existence at this time through whose channels the desired results may be obtained. The society is undertaking this work, and if given support in accordance with the importance of the end to be attained, will soon be able to show, in many directions, an improvements which may best be spelled in actual dollars and cents to the manufacturer and to the motor-car user.

The letters referred to are most worthy of careful reading, as being representative in every way of the general attitude of the machinery and raw material supply houses. Mr. Merryweather's letter is as follows:

CLEVELAND, O., June 21—Confirming recent conversation with President H. E. Coffin, I believe that the move of the Society of Automobile Engineers to standardize various material specifications, gauges and practices will be of the greatest value to the automobile manufacturers as well as to the material supply houses. Such work would also be of great value to the manufacturers of machine tools, and of small tools, and would greatly facilitate deliveries upon such goods and would decrease their cost to the manufacturer to a remarkable degree, because it would make it possible for the tool manufacturer to make up and carry such equipment in stock upon a commercial basis. A large percentage of this kind of work is now done to special order, because of infinitesimal differences in the specifications of every automobile manufacturer.

As only one of the many cases in point, take as an instance the broaching machine. If the automobile engineers would settle upon a standard for squared holes, giving distances across corners, and other dimensions in some definite ratio to the diameter of the shaft, and would tabulate this data for general use, it would mean an immense saving, both in time and money, over the present method of making each broach to special order, and one at a time.

Broaches for transmission gears, to be fitted upon shafts, with three or four keyways, should receive the same standardizing treatment as should those for squared holes. Valve-seat reamers, of two or three different angles of seat, could very well be standardized, and made up in a quantity commercial way in the various necessary diameters.

This same principle of recommended and tabulated standards could be carried out in innumerable directions to the very great benefit of the industry. Uniform standards in the specifications of materials, and tools, would insure immediate delivery to the manufacturer.

We believe that the work in this direction upon the part of the engineering organization is of very great importance and wish you every success along these lines.

(Signed) G. E. MERRYWEATHER.

Seamless Steel Tubes Demand Attention

DETROIT, June 18—Confirming by conversation with President H. E. Coffin yesterday in regard to standard sizes of seamless steel tubing for automobile construction we are preparing a card showing such standard sizes and will submit a rough draft of this card to you next week.

We cannot impress too strongly the importance, not only from the tube manufacturers' standpoint, but from the automobile manufacturers' view, of the necessity for the automobile manufacturers confining their orders to standard sizes. You can readily understand that if the tube manufacturers can work at their mills on standard sizes only, that they can increase their output and in that way make more prompt deliveries of material. Furthermore, if working only on standard sizes, the quality of the tube is bound to improve, as it goes without saying that when a workman turns out a regular product he is more inclined to become expert than if his energies are split up on a variation of sizes and gauges. On pick-up orders, some things that every automobile manufacturer is forced at times to purchase, if they have adopted a standard size, they can more readily secure what they want.

This matter was agitated some three years ago and at that time automobile manufacturers were ordering approximately 1,600 different sizes and gauges, but to-day there are only about 800 or 900 different sizes. The standard sizes listed to-day by the two manufacturers represents about 300 different sizes and gauges, and it would seem from the two manufacturers' point of view that a standard size could just as well be adopted as some odd size. After the adoption of the table of standard size in accordance with the rough draft we proposed to submit to you it would mean merely consulting a trade book or framed table in the drafting room, to find out what was a standard size, and then make their plans accordingly. We give below a memorandum of a few odd sizes which have been ordered recently:

(OD, outside diameter; ID, inside diameter.)

7-8 OD x 1-8 wall, 1 1-4 OD x 1 ID, 2 9-16 x .142 wall, 1 1-8 x 1-8 wall, 1 21-32 x 1 3-16 ID, 1 9-16 x 1 3-16 ID, 2 11-16 x 2 5-16 ID, 2 11-16 x 2 3-16 ID, 2 x 9-32 ID, 2 3-8 x 1 5-8 ID, 3 3-8 x 2 3-8 ID, 1 3-16 x 3-4 ID, 15-16 x 5-32 wall, and .855 x 7 gauge.

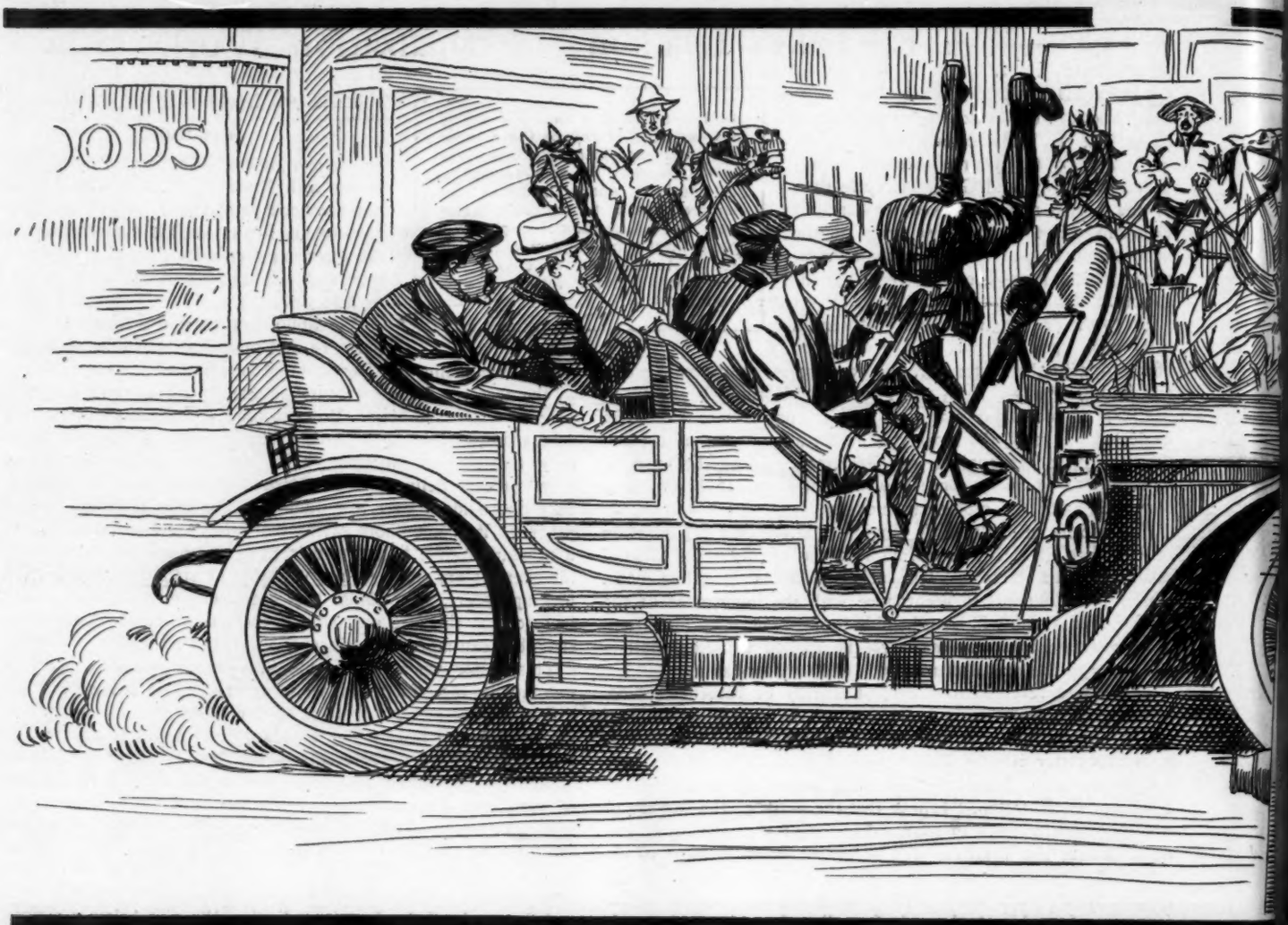
Any of these sizes mentioned above could have been changed by the automobile manufacturer in his original plans to a standard size. Take a tube ordered with a 1-8-inch wall, which size is not listed as a standard gauge, but 11 gauge could be used just as well. The 1-8 inch representes .125 inch and 11 gauge .120 inch.

On the question of variations, there seems to be a general opinion among automobile manufacturers that seamless tube is a finished product and can be furnished practically the same as a machine job. This is not the case and the automobile manufacturer should treat seamless tube as a raw product. This is particularly true where absolute accuracy is required, and in purchasing this material they should take this into consideration.

Tubes smaller than 2 inches OD will vary .005 inch minus to .005 inch plus on both the OD and ID. Tubes 2 inches and larger will vary from .010 inch minus to .010 inch plus on both OD and ID. The wall may vary not more than 10 per cent. of the specified thickness. Any tube which would meet with the above specifications would be passed by the tube mill inspector.

I would respectfully suggest that the Society of Automobile Engineers adopt as standard the sizes which will be shown on the card to be issued, and that the variations outlined above be also considered as standard by the society.

(Signed) H. S. WHITE.



SEEN IN NEW YORK: AUTOMOBILE ENTERS CONGESTED THOROUGHFARE FROM A

Long Island Railroad Regulating Automobile Traffic

JUST as it did thirteen years ago, Tally-ho Crossing of the Long Island Railroad at Valley Stream, took grisly death toll Sunday afternoon, when a swift train of the railroad crushed out the lives of Miss Jeanette P. Crawford and her sister, Miss Charlotte M. Crawford. Andrew Crawford, father of the dead girls, and himself a well-known manufacturer and sportsman, escaped death by a miracle, and Charles Neugebauer, chauffeur, was dangerously injured.

The grade crossing, like many of those of the Long Island Railroad, was inadequately protected. Despite the fact that the topography of the adjacent country renders it a constant peril, only a bell arrangement had been provided to warn travelers, and the survivors say that it was not rung.

In 1897 a tally-ho full of Sunday school pupils was run down at the identical spot where Sunday's accident occurred, and several of the children were ground to death.

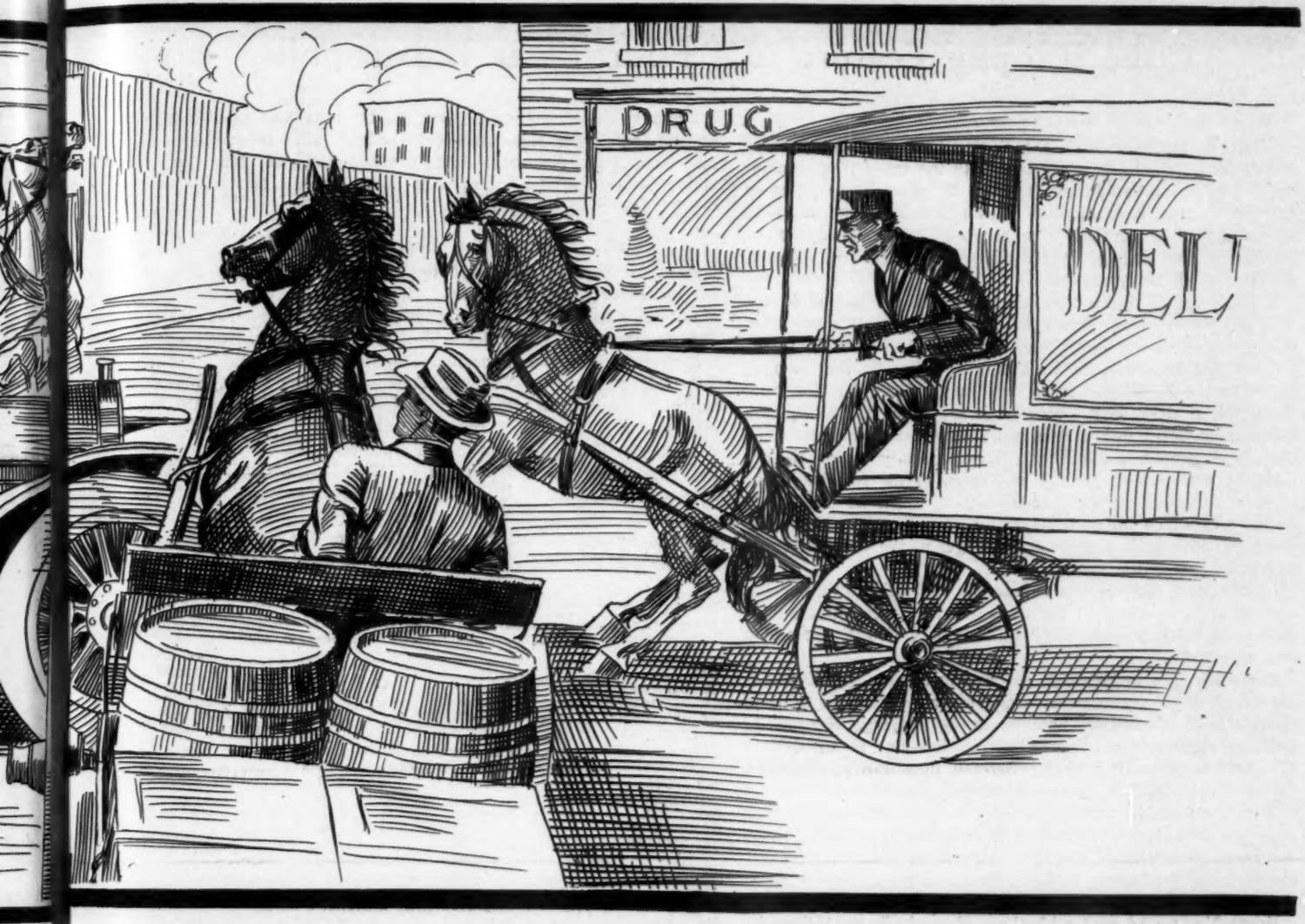
The Long Island Railroad Company is and has been a powerful influence in Long Island politics and economics. If one might lay a finger upon the most potent force that has been exerted to control and regulate automobiling on Long Island, that finger would rest not far from the headquarters of the Long Island Railroad Company.

It has always been sharply opposed to fast and reckless operation of the automobile and it has been whispered that moderate and legal motoring never met with much enthusiasm from the railroad management—at least as far as it applied strictly to the public.

In defence of the railroad company it has been said that if the Crawfords had not owned a motor car, the young women might be alive to-day. On the other hand, it has been pointed out that if the Sunday school children had not been taken out for their picnic in a tally-ho thirteen years ago, they might now be active members of the community, instead of sleeping on to eternity, under tear-wet mounds of green.

The position of the railroad company is entirely justified. If no pedestrians, carriages, tally-hos, automobiles or other conveyances of human beings ever cross the death-trap at Valley Stream, there can never be another fatal accident at that point unless, perchance, spreading rails or some mechanical defects in the trains cause a wreck. The company believes in enforcing the law—at least in the enforcement of some laws. Just why it should show favoritism about upholding those affecting the automobile in preference to those aimed at protecting the general public is a mystery.

In the meantime, unless the railroad company diverts a moiety of its energy now expended in "regulating" automobile traffic to the protection, or, better yet, the elimination of its numerous ghastly grade crossings, the people of the great State of New York can only look on, puzzled that the efforts of such a great corporation to prevent loss of life meet with no better success.



LATERAL AND IS RUN INTO BY A BICYCLE—DUE CAUTION WAS NOT OBSERVED

Chicago Motor Club Selects Elgin Race Dates

CHICAGO, July 4—So far this year no American road races have been run with the exception of a minor event in California, but the prospects are that this fall will see a series of brilliant contests. In a word, there will be a circuit starting in the West and winding up in the East, which will bring on five big road races within six weeks. This was assured when it was announced the latter part of the past week that the Chicago Motor Club had selected August 28 and 29 for its two days of road racing at Elgin.

While this matter has been in contemplation for some time, it was not until the night the Glidden tour finished in Chicago that the matter was brought to a head. At that time the Chicago Motor Club and the Elgin Automobile Road Racing Association signed a contract, the former to do the promoting of the races and the latter to finance them. The Elgin Automobile Road Racing Association is composed of prominent citizens of the town who are loyal enough to the city to give their time and money in advertising it in this manner. The Elginites have agreed to raise $20,000 to meet the financial requirements of the race.

This means the start of a circuit that will jump from here to Lowell, Mass., in case the Bay Staters decide to repeat their program of last year. After that there will be the Vanderbilt Cup race on the Long Island Motor Parkway on October 1. The Saturday following, October 8, there will be run at Philadelphia the third annual Fairmount Park road race. The circuit will wind up October 15 on the Long Island Motor Parkway with the running of the American Grand Prix.

The plans of the Chicago Motor Club at Elgin call for the running of three races simultaneously on August 28. These will be for the smaller classes. The 160-230 cars will run 144 miles and the winner will get $300 in cash besides the cup; the 230-300 class goes 180 miles with the same prizes up; while the 301-450 division travels 216 miles and the winner gets $400 cash and a cup. On Saturday the big race will take place. It will be for cars under 600 cubic inches and of a minimum weight of 2,300 pounds. The distance is set at 306 miles, and in addition to the trophy there will be three cash prizes of $1,000, $300 and $200 respectively for first, second and third.

Military protection will be secured for these races, and the course that is to be used will be the 9-mile circuit, which is exactly 1 mile west of the business center of the town. The course is declared to be a remarkably fast one, there being no roads crossing it, while the roads are particularly wide and the ditches shallow. There are only four turns in the course and one of these is a hairpin. At no place will it be necessary to shift a gear, unless perhaps at turning a corner. It is proposed, however, to bank these turns, and the chances are that the circuit will be good for 70 miles an hour by the time it is ready to race on.

Cobe Trophy Feature of "Fourth" at Indianapolis

(*Continued from page 2*)

on Burman, but the man in the Marquette-Buick was not to be denied, and dashed across the tape with the speed of a cannon-ball. He had covered the 40 miles in 31:46.02, 50 miles in 39:47.86, 80 miles in 64:24.48, 90 miles in 1:12:27.84 and 100 miles in 1:20:35.63, all of these new records for the 301-450 class. Dawson in the Marmon landed the 60-mile record in 48:15.29, and the 70-mile in 56:05.65.

Burman in the Buick Special carried off the honors in the mile time trials which opened the day's sport, showing 58:35 for the sprint, which was faster than Aitken in the National, Hearne in the Benz, Robertson in the Simplex, Wilcox in the Simplex, and Merz in the Empire could do. In the races that followed, Robertson in Herreshoff, Chevrolet in the Buick and Marquette-Buick, and Grant in the Alco were among the winners. The Greiner National and the Aitken National also scored, while the handicap was won by George Robertson in the Simplex. Aitken's victory was in the free-for-all, in which he defeated a choice field which included Robertson in a Simplex, Hearne in the Benz, Wilcox in the Simplex, Zengel in the Chadwick, and Burman in the Buick Special.

INDIANAPOLIS, July 4—It was indeed a well-satisfied throng that witnessed the wind-up of the three-day race meet on Monday, the Fourth of July, and a most befitting sane Fourth celebration it proved to be.

Event No. 2, a 10-mile race for cars in the 161-230 class, was put on first to try out the track. There were six starters in this race, including Sutcliffe in a Maytag, Kenyon in a Fuller, Miller in a Warren-Detroit, Endicott in an E-M-F, L. Chevrolet in a Buick, and Burman in a Buick. Sutcliffe, Endicott, and Burman got away together in this event, but the end of the fi st lap found Chevrolet in the lead, with Burman about 50 yards behind him, with the rest stringing along about 100 yards behind him. The race was a romp for Chevrolet and for Burman, the former finishing first in 9:12.23, and the latter second.

Event No. 1 was next with three Herreshoff cars driven by Roberts, McCormick and Herreshoff as starters. It was a 5-mile event for stock-chassis cars of Class B, Division 1, having 161-cubic inches piston displacement or under. Roberts took the lead in this event and was ahead by about 200 yards at the end of the first lap, and at the finish he stretched the distance to about 300 yards, with Herreshoff second and McCormick a slow third. The time was 5:32.87.

Event No. 3 was a 5-mile race for stock-chassis cars with a piston displacement of 231-300 cubic inches. Seven cars lined up for the start in this event, with Fox in a Pope-Hartford, Moore in the Great Western, Davis in a Great Western, Cook in a Black Crow, Stinson in a Black Crow, Heineman in a Falcar, and Pearce in a Falcar. While these cars were lined up, and before the race was started, the Remy Trophy, and the Remy Grand Brassard, won in the 100-mile race Saturday, were presented to Robert Burman.

Pearce's Falcar got away first at the start, but Heineman immediately forged ahead and took the lead, while Moore killed his engine at the start and dropped out of the race. Heineman won in this event, with Pearce second, and Stinson third. The time was 4:44.31.

Cobe Trophy Was Then Competed For

At 3:10 fourteen cars lined up for the Cobe Trophy race, the big event of the afternoon, which was open to all stock-chassis cars having 600 cubic inches piston displacement or less. The distance was 200 miles. The fourteen starters included Wilcox in a National, Fox in a Pope-Hartford, Kincaid in a National, Aitken in a National, Cook in a Black Crow, Stinson in a Black Crow, Harvey in a National, Grant in an Alco, Harroun in a Marmon, Dawson in a Marmon, L. Chevrolet in a Marquette-Buick, Burman in a Marquette-Buick, A. Chevrolet in a Marquette-Buick, Pearce in a Falcar, and Wishard in a Mercedes-Simplex. A. Chevrolet in a Marquette-Buick led the field at the end of 10 miles, closely pursued by Burman and Kincaid. Burman led till the 180th mile, when the Dawson Marmon swung into the lead and was never headed.

Details of he Doings on July Fourth

Event 1, stock chassis cars, Class B, Division 1—160 cubic inches piston displacement and under. Distance, 5 miles

No.	Car	Driver	Time 2 1-2 Miles	Time 5 Miles
19	Herreshoff	Roberts	2:50.00	5:22.88
21	Herreshoff	Herreshoff	3:04.08	5:55.35
20	Herreshoff	McCormick	3:23.25	Too far behind for time

Event 2, stock cars, Class B, Division 2—161-230 cubic inches piston displacement. Distance, 10 miles

No.	Car	Driver	5 Miles	10 Miles
35	Buick	L. Chevrolet	4:46.43	9:12.23
36	Buick	Burman	4:48.88	9:21.77
26	E-M-F	H. Endicott	5:03.92	9:51.22
2	Maytag	Sutcliffe	5:03.49	9:51.55
5	Fuller	Schwitzer	5:18.73	10:17.86
24	Warren-Detroit	Miller	5:04.10	——

Event 3, stock chassis cars, Class B, Division 3—231-300 cubic inches piston displacement. Distane, 5 miles

No.	Car	Driver	2 1-2 Miles	5 Miles
44	Falcar	Heineman	2:30.56	4:44.31
45	Falcar	Pearce	2:37.68	4:55.45
17	Black Crow	Stinson	2:39.62	4:57.19
3	Pope-Hartford	Fox	2:45.85	5:31.53
15	Great Western	Davis	2:57.03	5:44.32
16	Black Crow	Cook	2:46.65	5:45.84

Event 4—Not run. Scratched from program

Event 5, stock chassis cars, Class E—Opened only to registered amateur drivers in accordance with definition of racing rules of the A. A. A. Distance, 5 miles

No.	Car	Driver	2 1-2 Miles	5 Miles
48	Mercedes	Wishard	2:17.30	4:21.34
12	National	Greiner	2:17.25	4:21.35
1	National	Tousey	2:27.12	4:54.82

Event 6, Cars Class D—Free-for-all open race. Open to all cars entered at the meet. Distance, 20 miles

No.	Car	Driver	5 Miles	10 Miles	15 Miles	20 Miles
22	Benz	Hearne	3:34.48	6:58.55	10:25.17	14:06.72
8	National	Aitken	3:39.97	7:01.17	10:35.29	14:18.37
43	Buick Special	Burman	3:36.10	7:03.79	11:00.97	15:39.17
32	Marmon	Harroun	4:04.16	7:53 62	11:44.22	16:13.96
18	Chadwick	Zengle	4:17.02	8:03.20	11:44.23	.....
29	Stoddard-Dayton	Tripp	4:04.99	7:57.20	.....	.....

COBE TROPHY. DISTANCE 200 MILES. STOCK CHASSIS

Car No.	CAR	DRIVER	10 Miles	20 Miles	30 Miles	40 Miles	50 Miles	60 Miles	70 Miles	80 Miles
31	Marmon	Dawson	8:38.21	16:31.97	25:55.81	34:07.05	42:18.78	50:21.35	58:22.49	66:21.30
40	Marquette Buick	Burman	8:27.78	16:25.12	25:48.30	33:59.41	42:05.33	50:16.05	58:20.37	66:21.12
30	Marmon	Harroun	8:34.92	16:26.60	25:48.98	35:57.91	44:06.28	52:18.37	60:23.06	68:20.88
27	Alco	Grant	8:23.66	16:25.80	25:51.84	35:40.52	43:51.07	51:59.35	61:48.26	70:00.43
39	Marquette Buick	L. Chevrolet	8:36.44	16:30.98	25:52.55	34:04.93	44:03.69	53:42.57	61:48.06	69:49.54
17	Black Crow	Stinson	9:23.79	19:32.00	28:28.20	37:28.76	46:25.91	55:23.83	68:18.62	77:23.65
16	Black Crow	Cook	9:39.95	19:49.78	28:58.38	42:40.15	52:06.16	61:13.59	70:19.17	79:26.15
41	Marquette Buick	A. Chevrolet	8:18.72	16:17.75	25:22.97	34:31.53	42:26.30	50:19.94	58:13.27	66:14.65
45	Fal-Car	Pearce	9:23.55	19:32.17	28:27.98	37:28.46	46:24.33	55:20.83	64:16.23	73:13.77
7	National	Aitken	9:59.38	25:48.77	34:01.36	46:00.19	62:08.04	70:14.77	78:15.10	86:09.74
6	National	Kincaid	8:28.10	16:21.41	27:32.17	37:33.21	48:29.27	64:55.47	83:26.57	105:21.72
48	Mercedes Simplex	Wishard	8:28.41	16:33.55	26:15.70	34:49.65	43:29.04	.....	.....	.....
1	National	Wilcox	8:38.21	16:34.61	25:28.15	34:12.30	.....	.....	.....	.....
3	Pope-Hartford	Fox	8:45.09	16:46.07	.....	.....	.....	.....	.....	.....

Will the Aeroplane Nullify the Dreadnought?

WHAT the effect of the aeroplane will be as a measure of military offence and defence was foreshadowed when Glenn Hammond Curtiss recently dropped fifteen out of twenty-two dummy bombs within the outline of a battleship, which was simulated by a series of flag-buoys at Keuka.

Time after time the aviator crossed the target from side to side, dropping pellets of lead from varying distances and heights in order to demonstrate the efficiency of the aeroplane as a military force.

The conditions of the test were hardly those that would be met with ordinarily in service, for the target was stationary and, naturally enough, made no effort at offence or defence. It was shown that at low elevations the aviator was able to drop the bombs with accuracy and at 300 and 400 feet heights they scored center shots every time. When Curtiss shot his flying machine up to 900 and 1,000 feet, his bomb practice was not so good.

His machine was specially equipped with canoe-floats and this part of his preparations for the test received a thorough try-out, as he found it necessary to descend abruptly during one stage of the experiment and landed gracefully upon the smooth surface of the water. The canoes sustained the aeroplane and the aviator suffered nothing worse than a slight wetting.

The news of the accomplishment of Curtiss sent a thrill of apprehension clear around the world. Every foreign capital, as well as Washington, was tensely interested. The significance of the feat was apparent to all; not so much from the simple fact that bombs could be dropped from an aeroplane under favorable conditions so that they would strike a mark of the same size as a $10,000,000 battleship at anchor, as it was the fear of what a few simple developments might bring forth. If it is now possible to land dummy bombs on the deck of a great Dreadnought, in natural course of development, it is not improbable that the aeroplane will soon be able to drop torpedoes carrying 100 pounds of the highest powered and most concentrated explosive upon a similar mark with equal or greater accuracy.

All naval authorities agree that if enough high explosive can be detonated upon the deck of any ship, the ship must be destroyed. Therefore, the perturbation over the achievement of Mr. Curtiss is acute all over the world.

The Austrian Government, which recently laid down four super-Dreadnoughts, was palpably shocked. Archduke Leopold Salvator, at Vienna, exclaimed that international law will have to prohibit the use of aeroplanes in naval warfare. Prof. Parseval, a distinguished German scientist, said that he believed that an elevation of 1,200 feet was sufficient to protect an aeroplane from the secondary battery of a battleship and that at this height the aeroplane would be able to land bombs all over the ship. Hiram Maxim and Thomas A. Edison declared that further development of the aeroplane along this line was only a little way in the future.

In the late Russo-Japanese war, when the Japanese battleship fleet was blockading Port Arthur, the ships traveling leisurely up and down the narrows within a comparatively short distance of the beleaguered city, half a dozen aeroplanes capable of swooping down from the fortress in the dead of the night and dropping 100 pounds of nitro-glycerine down the funnels of the battleships, would have proved a moral deterrent that might have changed the fortunes of war even though no practical trial of their prowess was attempted.

The past week has also seen a number of interesting trials of the aeroplane in more peaceful lines of endeavor. Mrs. William K. Vanderbilt, Jr., made a trip in a Farman biplane as a passenger of Clifford B. Harmon, over the course of the Garden City Club, New York.

On Saturday Mr. Harmon, under peculiarly favorable conditions of wind and weather, broke the world's record for sustained flight when he drove his immense biplane 125 miles in two hours and three and one-half minutes. The machine weighs slightly more than 1,000 pounds and is the same machine with which Louis Paulhan set the old mark at Los Angeles, when he flew one hour and fifty-eight minutes without descent. Mr. Harmon took a circular course, widening the swings as the flight grew longer. The air was still during most of the trial and the start and landing were without special incident. Mr. Harmon has planned several ambitious flights for the near future.

Charles K. Hamilton, the hero of the great inter-city flight between New York and Philadelphia, gave a remarkable exhibition of his mastery of the air in his home town, New Britain, Conn., Saturday. After a number of preliminary attempts, he arose perfectly, circled the city and turned up Main street, sailing from the city limits to City Hall.

Two Cars of Solar Lamps a Month

One of the instructive and interesting items of automobile activity is the monthly shipment of two carloads of Solar lamps from the manufacturers, the Badger Brass Manufacturing Company, to the Chalmers-Detroit Motor Car Company. Solar lamps are now used as part of the regular equipment of 85 per cent. of the high-grade American cars, according to statistics compiled by their makers. Aside from automobiles, these lamps are made for bicycles and motor boats of all kinds.

Great Western's Winning Climb

The showing of the Great Western "30" in the free-for-all event of the hill climbing contest held at Pittsburg, Indiana, recently, was specially creditable. The great Western only recently has essayed to capture laurels in races on the flat and up hills, and its performances have proved decidedly meritorious on all occasions.

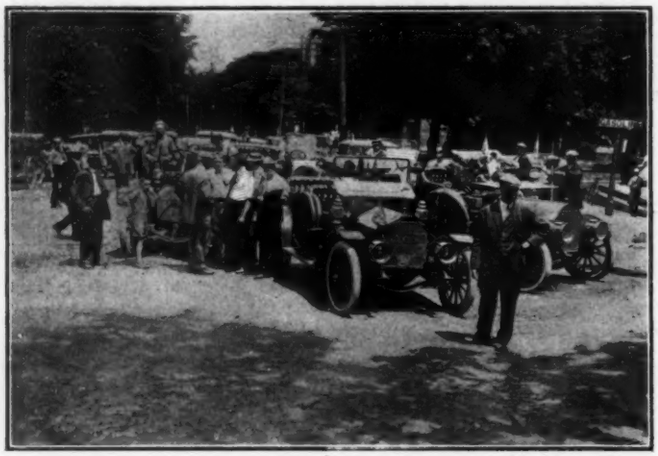
In the event referred to, four Buicks, one Oakland and Ford competed unsuccessfully with the Indiana car.

CARS, 600 CUBIC INCHES PISTON DISPLACEMENT OR LESS

90 Miles	100 Miles	110 Miles	120 Miles	130 Miles	140 Miles	150 Miles	160 Miles	170 Miles	180 Miles	190 Miles	200 Miles
74:22.23	82:15.24	90:08.52	98:16.63	107:42.20	115:40.77	123:36.23	131.31.77	139:25.61	147:17.07	155:17.93	163:20.14
74:20.80	82:11.96	90:01.21	97:54.08	105:50.36	113:53.30	121:54.25	129:53.52	139:07.83	146:51.63	155:50.75	163:23.67
76:29.63	84:13.23	92:08.53	100:05.94	108:07.42	116:08.26	124:07.37	132:03.72	140:05 95	148:06.44	156:38.94	165:26.34
78:09.39	86:11.67	95:48.58	105:53.19	116:03.98	124:19.10	132:37.95	142:39.44	150:58.29	159:05.28	167:10.69	176:49.30
77:52.22	85:51.82	95:02.54	103:43.77	123:35.67	131:33.65	143:05.30	152:42.50	160:42.88	168:58.64	177:20.36	187:08.02
86:28.11	95:26.92	104:24.24	115:21.43	124:24.62	133:26.66	142:26.05	151:26.87	166:02.35	175:12.28.	184:19.16	
88:35.93	102:08.99	111:08.54	124:25.77	133:25.22	142:26.25	153:43.39	162:47.56	171:53.12	180:59.63	190:14.33	
74:14.43	82:10.96	90:00.08	97:54.92	108:10.21	117:14.27	126:22.03	Out in 62d Lap				
82:09.81	90:53.30	99:41.88	108:26.33	117:15.54	126:02.45	134:47.47	Out in 61st Lap				
101:22.95	116:10.05	125:25.67	139:33.35	153:07.89	Out in 55th Lap						
117:43.90	128:02.65	136:04.34	144:06.67	153:59.16	Out in 55th Lap						

Highway Commissioners Prove Road Reliability

ROCHESTER, N. Y., July 4—With a business session in the Monroe County Court House, in Rochester, on Friday morning, the third semi-annual conference of the New York State Highway Commission with its Division Engineers, Section Superintendents, Division Supervisors, and the County Superintendents of Highways, came to a close.



Lima Noon Control: Enjoying scenery and surroundings

The business meeting was held largely for the purpose of discussing the conditions encountered by the members of this conference during the two days trip over the roads of five western counties.

Criticisms were made and views were interchanged as to the methods of conditioning the territory covered.

The principal criticism of the earth roads over which this trip was made was the fact that the many County Superintendents, overzealous to have the roads in fine shape, used poor judgment in scraping them and improving them just a few days before the run. This work served only to fill the center of the roads with inches of flour dust so as to make the travel rather strenuous.

On Thursday night a banquet was served on Ontario Beach at which more than 200 attended. One feature in connection with this run was that out of the eighty-one cars that started from Rochester, carrying nearly 400 persons, not a report of mechanical trouble of serious nature was made, and there were no accidents. So far as could be learned at the headquarters the only delays were due to tire trouble and they were noticeable by the smallness of their number. The cars which carried these road builders were almost entirely privately owned by members of the Automobile Club, of Rochester, and driven by amateur drivers, who did well.

As to the finality of this run the State Engineering Department is getting out a book which will contain a detailed report of all the observations made, together with photographs of the roads, drawings of crossings, bridges, etc., the idea being to perpetuate the good work, and economize cost.

Minnesota Enjoys Three-Day Meet

At the recent race meet staged on the Hamline track, near Minneapolis, a number of fast time trials and interesting contests were developed. The meeting extended over three days, and among the cars that made creditable showings were the following:

Cutting, which won a five-mile handicap event in 5:23.50; Marmon, which won a free-for-all in 5:43.80, defeating Oldfield, and two match races which were won by Cuttings.

Oldfield and Kerscher took part in the exhibition in a prominent way. The events were pulled off in regular order and with good success.

Auto Factory to Locate in Louisville

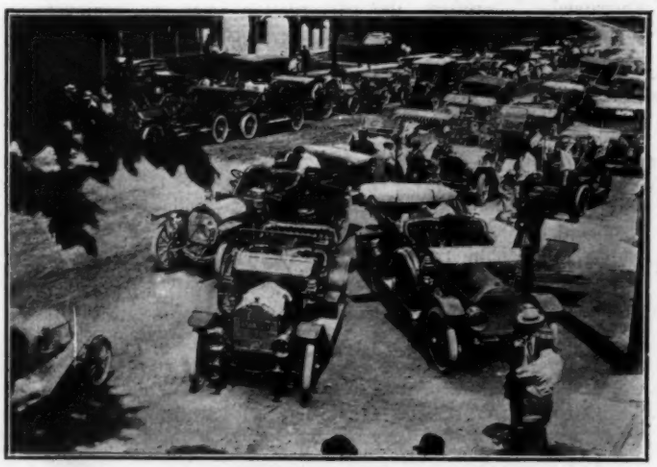
LOUISVILLE, July 4—Louisville will soon have its first automobile factory. It was announced last night by Berton B. Bales that the American Automobile Company, of which he is the president, will establish a factory in this city to cost approximately $125,000. Operations will begin January 1. The company is now manufacturing Jonz pleasure and commercial motor cars in its plant at Beatrice, Neb., and has orders on hand which will require nine months to fill. The plant in Louisville will be the main factory of the company.

Offices have been opened in this city and members of the company are negotiating for the purchase of a site. The company also has an office in Kansas City and is preparing to open a branch factory there. The American Automobile Company was organized in Arizona in May and has an authorized capital stock of $1,000,000. The stockholders at present comprise business men of Chicago, Kansas City and Louisville.

No water is required in cooling the engine and it is equipped with a two-cycle, vapor-cooled motor. At present the company is erecting a $20,000 extension at its Nebraska plant.

The Radcliff Motor Car Company, distributors of the Stevens-Duryea, has leased 916 South Third avenue and expects to occupy its new salesrooms about July 15. The Radcliff Motor Car Company is a newcomer in the local field.

The Reimers Motor Car Company has increased its capital stock from $10,000 to $50,000. The stock will be divided into $30,000 common and $20,000 preferred. The increase in capital was made to handle its new garage, which was formally opened to-day and to carry a larger stock of cars, supplies and parts. This company is the agent for the Reo and Haynes cars.



There were 81 cars at the noon control at Lima

Quaker Owners Buy a Club House

PHILADELPHIA, July 4—The large brownstone and brick residence at the northwest corner of Broad and Diamond streets, Philadelphia, occupying a lot 25 by 138 feet, and formerly owned by the late Senator Charles A. Porter, was bought Friday from the Porter estate by the Automobile Owners' Association for about $30,000, and will be altered into a club house. It is proposed to build a modern establishment.

Three New Companies and a Club Formed at Detroit

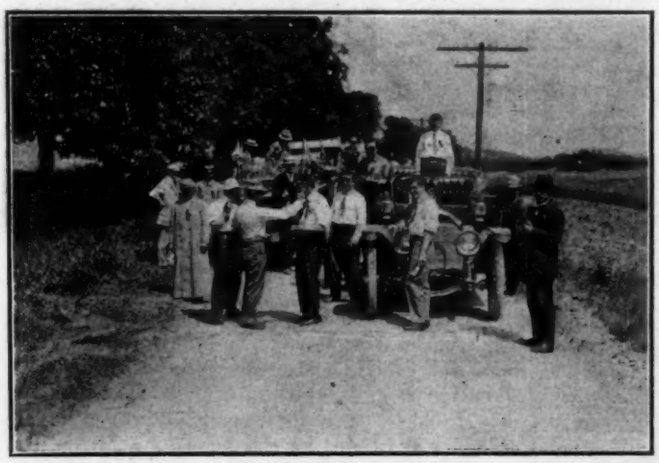
DETROIT, July 4—Three new companies and one new automobile club were announced in Detroit last week. The Exposition was the scene of one announcement, Wednesday night, when the first model H. & F. Electric was placed on exhibition there.

This car has just been completed by Frank D. Hovey and F. E. Foulke, the latter a Kansas City man of long automobile experience. The car has a number of new and different features, among which may be mentioned: a full aluminum body; light weight, 2,200 pounds; large carrying capacity, five to six persons; new battery construction, which yields 140-150 miles per charge; motor and rear axle in a unit. A company is now forming to manufacture the car, upon the construction of which the inventors have a number of patents. This company will, doubtless, be capitalized at $1,000,000. Four sites for the factory are under consideration, and so far has the matter progressed that part of the production for next year, 1,500 cars, has been contracted for. The present car sells for $3,000, but a lower priced model will also be built.

The Brush-Chicago Motor Company has incorporated for $12,000, while the Bower Roller Bearing Company, spoken of in last week's paper as about to remove here from Dayton, has incorporated as a Michigan concern for $225,000. The principal stockholder is given as Charles F. Lawson, Detroit.

At Ecorse the newly formed Jennings Motor Car Company is dickering with the town officials over a site for buildings, with fair prospects of coming to an amiable agreement shortly. This company has just been formed by influential Detroit business men, who wish to locate their factory near the city, but beyond the limit of city taxes.

It was announced from Wyandotte that the negotiations between the Seitz Motor Truck Company and the city had been satisfactorily closed and that the company would remove to the town at once. The town subscribed for $35,000 of the company's stock. J. H. Bishop and W. R. Beatty, representing the company, declared that the new plant would employ 500 men at the start, enlarging the force as necessity demanded.

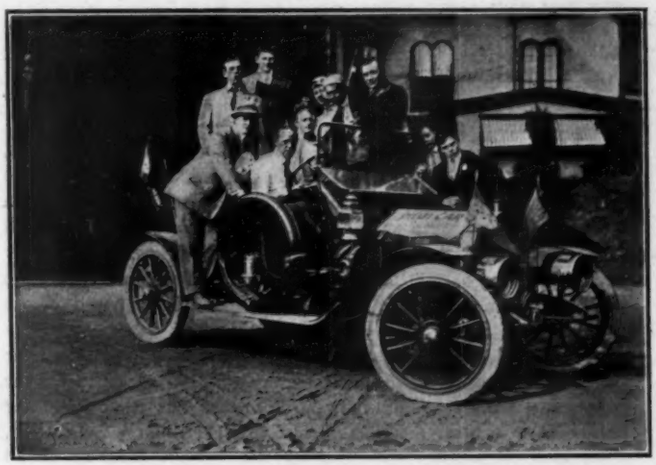


Inspecting McClintock's Cube Block Pavement near Charlotte

The new automobile club formed during the week will be named the Wolverine Automobile Club. A large membership is promised for the near future by the well-known and hustling men who comprise the organizers and first board of directors. The incorporators are: Messrs. Abbott, Brauns, Bryant, Collins, Gill, Gilmour, Mills, Radle and Trege.

During the past week the Hayes Mfg. Co. declared a stock dividend of 25 per cent., thus increasing the capital of the company to $500,000. This company declared a stock dividend last April of 200 per cent. The company now employs 1,100 men and does a business aggregating $1,125,000.

Great preparations are being made here for Elks' Week, which will begin July 11 and last about five days. During this period, the number of cars expected in the city is unusually large, so that extra provisions must be made to house them. Some 10,000 cars are expected.



Secretary Van Tuyler, of the Rochester Automobile Club, at the wheel of the Selden Pilot Car

During the past week, the activity of General Motors stock has been such as to cause much comment. The stock has risen steadily in the face of a lowering of prices in all other stocks, the rise in three days being from 118 to 125. One surmise made in financial circles and going the rounds now is that a stock dividend of 75 per cent. will be declared.

Wednesday night at the Pontchartrain there was given a rather remarkable affair when the representatives of the E-M-F Company and of the Studebaker Automobile Company sat down to a banquet, which was presided over by President Flanders of the former company. The Detroit men present were: W. E. Flanders, Robert Brownson, Frank E. Fisher, B. W. Twyman, Paul Smith, L. H. Rose, George E. Voglesong, Amos. F. White, David Hunt, Jr., L. Logie, H. T. Ewald, D. D. Byers, F. A. Wade, C. F. Garaghty, James E. Spencer, Frank Shaw, G. H. Kleinert, Clarence Booth, Max Wollering, Thomas Walburn, and James Heaslet.

The out-of-town guests were: George E. Keller, South Bend; C. F. Redden, New York city; W. J. Higgins, New York city; E. V. Stratton, Philadelphia; Frank Staley, Indianapolis; H. E. Westerdale, Chicago; A. J. Pray, Columbus; C. R. Dushiel, Milwaukee; H. T. Patton, Louisville; A. E. Thompson, Minneapolis; C. H. Woodruff, Minneapolis; Mr. Honeywell, Denver; L. F. Weaver, Portland, Ore.; C. N. Weaver, San Francisco; Mr. Tehaney, San Francisco; Mr. Williams, Pittsburg; Frank Shaw, Dallas, Tex.; Mr. Witmer, Kansas City; C. C. Snoke, South Bend; C. M. Barber, Oklahoma City; N. P. Berger, Omaha; T. L. Hausmann, St. Louis; Charles A. Malley, Boston; John A. Graham, Fargo, N. D.; E. L. Jacoby, Memphis, Tenn.; E. M. Greene, Syracuse; George W. Hanson, Atlanta; C. M. Love, Atlanta; B. S. Woolraven, Atlanta, and Dr. C. C. Root, Washington, D. C.

Auburn Hill Climb Is Postponed

Owing to lack of preparation, the hill climb of the Automobile Club of Auburn (N. Y.) scheduled to be held Independence Day was indefinitely postponed. It has been announced that the event will be presented later in the season.

National Wins St. Louis Star Trophy Run

ST. LOUIS, July 4—National car, No. 20, driven by Carl Merz, with a final score of 992, was declared the winner of the St. Louis Automobile Manufacturers and Dealers' Association's three-day reliability run for the *Star* trophy, after the technical committee had spent two days inspecting the cars which finished the trip. And, with one exception, each of the thirty contestants which started out from St. Louis June 28 on the run of 418.1 miles made the entire circle, although one was withdrawn before the finish and another was disqualified by the technical committee.

On the final score Oldsmobile, No. 5, driven by B. W. Olin, and Colmbia, 13, driven by Eddie Ernst, tied for second place with 991 each. Fourth place was awarded to Buick, No. 3, driven by Frank Delaney. Its score was 990. The three latter cars will receive certificates for their road scores.

While not one of the thirty cars showed a clean score after the technical examination, eight completed the circle with perfect road scores.

This was the first reliability run of more than one day ever given in St. Louis and the first of any kind to be given by the makers and dealers. One error alone probably is responsible for the fact that none of the cars made the trip without penalization. There was no penalty for reaching the various controls ahead of time and this turned the run into a sort of road race, many of the drivers hitting it up at a 25 and 30-mile rate when they found the road bed to their liking.

A heavy rain fell the night previous to the starting of the run. The worst road conditions were on the first day out. After passing St. Charles, 40 miles of gumbo stretched ahead of the contestants. This had been softened by the heavy rain of the night before, and in some places the wheels sank almost to the hubs.

The first day's run was to Hannibal, with 45 minutes for lunch at Troy. This was the most eventful day of the trip. First, the crew of the Haynes car, No. 30, driven by A. A. Franklin, was arrested for a row with a farmer, who disputed the right of way, and the motor of the Haynes was stopped 125 minutes, with the result that the car was penalized 125 points. There also was a penalization for lateness. Rambler, No. 10, driven by William Smythe, got beyond the control of the driver just out of Eolia and rushed down a 20-foot embankment while making a speed of 40 miles an hour, hitting a telegraph pole and turning turtle. The four occupants, fortunately, landed in soft sod and none was seriously hurt. Marmon, No. 26, which was withdrawn, was compelled to limp in the last day from Macon on three cylinders. Stearns, No. 29, was disqualified after the finish when it was found that the brake had been wired to keep it in place.

On the second day's run the rods were fairly good, especially from Hannibal to Macon, where lunch was taken. The Buick pilot car driven by Crusoe, was compelled to halt owing to a broken torsion rod, but was soon repaired, and proceeded from Macon as confetti car. The Dorris car, in which were the officials,

No.	Car	H. P.	Entrant	Driver	Final Scores
20	National	40	General Motor Co.	C. Merz	992
5	Oldsmobile	50	Olds Motor Works	B. W. Olin	991
13	Columbia	48	Maxwell-Briscoe Motor Co.	Eddie Ernst	991
3	Buick	30	Buick Motor Co.	Frank Delaney	990
7	Oldsmobile	70	Olds Motor Works	W. F. Fewell	983
17	Ford	20	Ford Motor Co.	H. L. Bagley	979
28	Moline	30	W. Von Steiger	W. Von Steiger	979
4	Maxwell	30	Maxwell-Briscoe Motor Co.	Val Heinrich	978
27	Amplex	50	Missouri Motor Car Co.	Herman Schnure	977
1	Overland	40	St. Louis Overland Co.	C. E. Goldthwaite	975
6	Mitchell	30	C. M. Barnard	C. M. Barnard	972
19	Haynes	30	Haynes Automobile Co.	Carl Williams	958
18	Pope-Har'd	40	American Garage Co.	Walter Saigeon	957
9	Moon	45	Moon Motor Car Co.	Mat Blavait	956
8	Cadillac	30	Bagnell Automobile Co.	W. F. Bagnell	940
16	Mitchell	30	Weber Imp. Co.	J. H. Little	939
23	Stearns	60	Stearns Motor Power Co.	J. N. Dunwoodie	934
15	Everitt	30	Whittaker M. C. Co., A. J.	Frank Morris	932
12	Moon	45	Moon Motor Car Co.	Hugo Muller	893
21	Inter-State	30	Lindsay Motor Car Co.	H. M. Paine	880
24	Hupmobile	20	General Motor Co.	Roy Anslem	874
2	Moon	30	Moon Motor Car Co.	Eli Colluette	873
11	Dorris	30	Dorris Motor Car Co.	J. T. Rumble	843
14	Buick	30	Buick Motor Co.	James Ladd	770
25	Dorris	30	Dorris Motor Car Co.	J. E. Baker	713
30	Haynes	30	Haynes Motor Car Co.	A. A. Franklin	695
22	Buick	24	Buick Motor Co.	N. C. Tuxbury	691
26	Marmon	32	Missouri Motor Car Co.	Ed Holthaus	
10	Rambler	54	Kingman Implement Co.	Will Smythe	(disqu'ed)
29	Stearns	30	Stearns Motor Car Co.	Koken	(disqualified)

No. 28, Moline, Driven by W. Von Steiger

Overland, No. 1, with C. E. Goldwaithe at the Wheel

kept its position throughout the entire trip without any trouble. The second night control was Mexico. Up to this point, with the exceptions mentioned, everything had passed off smoothly.

The third day's run from Mexico to St. Louis was the fastest of the trip. The schedule set by the committee was an average of 20 miles an hour for cars of all classes. The road for two-thirds of the way led the contestants over rugged, mountainous roads. As a result much of the way the cars were required to run 25 to 30 miles an hour to make up for the time lost.

The Technical Committee was composed of George P. Dorris, of the Dorris Motor Car Company; Stewart McDonald, of the Moon Motor Car Company, and A. R. Van Antwerp, of the Van Automobile Company.

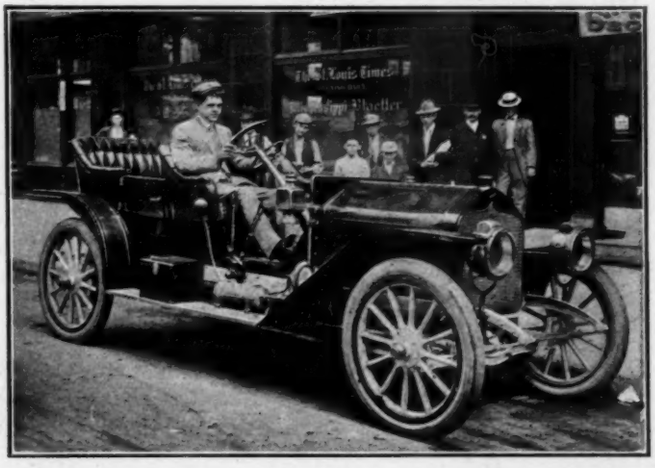
The cars which maintained perfect road scores were: Overland, No. 1; Buick, No. 3; Columbia, No. 13; Haynes, No. 19; National, No. 20; Inter-state, No. 21, and Moline, No. 28, and Oldsmobile, No. 5.

How the International License Works

PARIS, June 30—There is no need to obtain a driving and car license for every European country it is desired to visit. Slow, old-fashioned Europe has decided that all necessary safeguards can be taken by instituting one international license good for almost every country on this side of the Atlantic. It remains for the United States of America to insist that there shall be as many licenses as there are States.

The new arrangement, which is the outcome of an international conference held in Paris last year, provides for an international pass for both car and driver. The initial formalities are simple: Suppose the automobilist lands in Liverpool, he has his car examined by the local agent of the Motor Union, the Automobile Association, or the Royal Automobile Club. If it meets with the international requirements—and all modern cars do meet with these requirements—the owner is given a certificate stating his name and address, home registration, number of the car, a description of the car, maker's name, type of chassis and motor, the style of body and the weight in kilogrammes. If the car is registered in the United States, and carries an American number, the owner must place at the rear, above his home number, a black plate bearing the two letters U. S. If the car has been bought on landing in England, and is registered in that country, it must carry G. B.; if France is its country of origin and registration, it will carry the letter F.

Thus equipped, the car can be driven in Great Britain, France, Germany, Belgium, Italy, Monaco, Roumania, Servia, Austria, Hungary, Bulgaria, Spain, Greece, Montenegro, Portugal, and Russia, without any registration formalities whatever. In the same way the driver can undergo a practical examination and be provided with a license which will allow him to drive his car in all of the above countries for a period of twelve months without any formalities.



No. 20, National, Winner of the St. Louis "Star" Trophy

It is not necessary that a landing should be made in England in order to obtain this pass. If the automobilist disembarks at Havre the French Service des Mines will issue the necessary passes; if it is Italy or Germany the authorities charged with the supervision of automobiles, will grant the passes.

The new regulations do not in any way change the various customs formalities. In all protected countries it will be necessary to make the usual deposit on the car, or enter by the use of a triptych. Nor are the new licenses obligatory. If it is desired to go through the old formality of declaring the car, having the driver examined and changing the license tags at every frontier station, automobilists are at perfect liberty to do so. American automobilists possessing French cars and driving licenses, and intending to tour in this country only, have nothing to gain by applying for the international cereificate. As most Americans tour in three or four countries whenever they come to Europe, it is safe to declare that practically all of them will take advantage of this reform.

The only regrettable feature is that the United States has not thought fit to enter into this agreement. This would have made it possible for intending visitors to Europe to secure the international passes and affix the international license tag before leaving home. But if this were done, America would be under the obligation of allowing the Englishman, the Frenchman and the German to tour from New York to San Francisco with his home number and an international pass, while the native would have to comply with the automobile law of the different States he traverses. The object lesson is obvious.

Terms of Times-Post Flight Announced

Dates were set Tuesday for the aeroplane race to be given under the auspices of the New York *Times* and the Chicago Evening *Post* from Chicago to New York for a prize of $25,000. The race will start October 8 from the Windy City.

A résumé of the conditions follows: Entries may be made at any time after publication of the terms. There must be at least three competitors or no race. The start shall be 10 o'clock a. m., or as soon thereafter as may be, and shall be simultaneous, if possible. In case of bad weather the start may be postponed from day to day until October 15. Each entered machine must be in Chicago by October 3. The race must be finished within 168 hours from the start. Stops unlimited. Each entrant must have a verified record of one hour's continuous flight in Chicago between October 3 and 8. Repairs may be made en route, but aviators must finish in the same machines they make the start. If the start is simultaneous, the first machine that reaches the finish within the rules will be adjudged winner, but in case the entrants start at intervals due allowance will be made. A flight of equal or of greater length than the proposed course, prior to the race in this country, shall serve to invalidate its terms. The promoters of the event reserve the right to delegate the management of the affair to a recognized aeronautical society if such a course is deemed advisable.

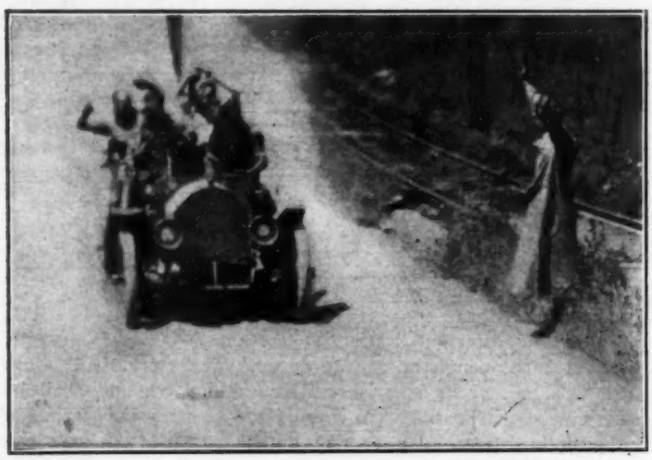
Wright, Curtiss, Hamilton, Baldwin, Seymour, Mars, Willard, Harmon, Bergdoll, Farman, Sommer, Rolls, White, Paulhan and Rougier are mentioned as possible contestants.

Thirty, No. 15, Everitt, Frank Norris Driving

Regal "Plugger" Finishes 22,000 Miles

DETROIT, July 4—Having accomplished its "Around the Circle Tour" of 5,000 miles, the Regal "Plugger" reached home and received a hearty welcome. The route covered by the car on this tour was from Detroit to Boston, to New York, to Kansas City, Lincoln, Omaha, Minneapolis, Milwaukee, Chicago and back to Detroit. Besides following this itinerary, the "Plugger" made numerous side trips, participating in several endurance and roadability contests which swelled its mileage 1000 miles more than was originally contemplated.

Among the sporting events in which it took part en route was



Regal "Plugger" on its way back to Detroit after concluding 5000-mile circle tour

the run of the Quaker City Motor Club from Philadelphia to Atlantic City, where the car with its tonneau covered with tags and certificates of numberless cities and towns visited during its journeys that total over 22,000 miles, attracted much favorable comment from participants in the event and large crowds at both ends of the run.

A fairly fast schedule was maintained throughout the whole tour and weather conditions were not regarded by the crew of the "Plugger." Several times the motor was stalled, owing to heavy going, and three times the car was capsized. The gumbo roads of Kansas, which were traversed during and after a series of unprecedented rainstorms, were the hardest problems for car and crew to solve.

The reception of the battle-scarred veteran was in the form of an automobile parade in which 100 cars participated. There was a brass band and a platoon of police and all the other things that go to make up a festal occasion. Mayor Breitmeyer, of Detroit, was the spokesman of the reception committee and said a few kind words of greeting from the entrance of the Hotel Pontchartrain.

The tour just ended began April 11, and from the outset almost to the conclusion, weather conditions were trying in the extreme. Several meteorological records were broken, particularly for rainfall in certain sections and for cold weather and bad roads throughout. One of the features of the work of the "Plugger" on all its tours is the presence of a tattered national banner. This flag was not always in such condition as it was when the car reached Detroit, but has been whipped and frayed out during the course of the numerous tours accomplished by the car. The "Plugger's" crew was: Lee Kuson, driver; George Franklin, Norman Taylor and Roy Dean.

Writing to THE AUTOMOBILE from Detroit, the latter, who was in charge of the tour of the Regal Plugger, has the following to say about road improvements noted upon the itinerary of about 6,000 miles:

Progressing east from Detroit, we began to see more of the macadam road as we got east of Cleveland. From there on to Boston one could readily realize that millions had been spent in making these highways what they are. Massachusetts, aside from the macadam, has found it advantageous also to use oil. This State exceeds all others in this respect.

West of the Mississippi the organization for the improvement of roads has not reached the perfection that prevails in the East, with the exception, I might say, of one State, Iowa. The great "River to River" road from Council Bluffs to Davenport, known as the Great White Sign Post road, is as fine a piece of highway as one would care to travel over. Every quarter of a mile, white sign posts have been placed all along it. When the road turns a hand pointing its direction stands ready to direct the wayfarer. Aside from this sign post road one finds nearly all the roads in good condition.

Good roads enthusiasts in Pennsylvania, especially those living in the district between Harrisburg and Greensburg, might learn an excellent lesson relative to the treatment of roads from what has been accomplished in Southern Indiana and Northern Kentucky, particularly as I found them between Louisville and Vincennes. The Harrisburg-Greensburg road leads over the Blue Ridge and Laurel Range of the Appalachian Mountains. Owing to the fact that McConnellsburg lies in a section that is inaccessible to the railroads, traffic over these ranges is naturally very heavy. But in spite of this fact it would hardly seem that the road question had been given any consideration whatever. For miles leading into McConnellsburg rocks and big stones are so strewn over the highways that it is almost impossible to drive an automobile through this section.

The Louisville-Vincennes road proves conclusively what can be done with such a thoroughfare as lies in the district of Pennsylvania of which I speak. The Hoosiers and Kentuckians fint it advantageous to take the stones from the highways, break them up with heavy crushers and place them back on the roads, with painstaking care relative to the grading, and they have succeeded in constructing an excellent highway. If the Pennsylvanians were to do the same the mountains lying about McConnellsburg could easily be negotiated wtih heavy auto trucks and exportation and importation carried on accordingly. They are attempting to overcome road traffic by constructing an aerial tramway from McConnellsburg to Fort Louden, the nearest railway station. But more could be accomplished were the highways to be put in a traveling condition for automobiles.

It is very interesting to observe the radical change that has

Mayor Breitmeyer, of Detroit, congratulating Lee Kuson, driver of "Regal Plugger"

taken place in the mind of the farmer relative to his attitude toward the automobile. Not over three years ago, in the majority of cases, the tiller of the soil was antagonistic. Seldom would one find him willing to extend a helping hand or mend his highways for the benefit of the automobile. Many were the occasions when we became stalled in the mud, and then we had to prevail on the generosity of the natives to aid us with their teams of horses and oxen. Compensation for the same was naturally always extended, but invariably it was refused, and almost always an apology was forthcoming on the part of the farmer for the condition of the

roads in his vicinity. Even though in some sections things have not reached a point where organizations are perfected to the point of thoroughly carrying out of good roads projects, the spirit is there and the future looks bright for better results.

Kansas, Nebraska and Iowa are reaping a certain amount of good through a law that allows each farmer fifty cents for dragging the road a distance of one mile and back. This puts the roads in fairly good condition. In some places, however, in order to obtain a good surface for carrying off the water, the matter has been overdone, and too much earth heaped in the middle of the highway. The result is that no one cares to travel on the center of this grade. The teamster or autoist prefers the side of the road, in which case one finds that for miles the center of the highway is grown up with grass, where if a little extra pains had been taken and a roller run over the center of the highway following the dragging it would have been sufficiently flattened down to induce the traveler to take the center of the road.

Michigan, Indiana and Illinois could well benefit by the example set by Iowa, Kansas and Nebraska, in the use of the drag. In fact, in some places it would seem that the use of this valuable piece of simple mechanism has been entirely ignored. As a result, in dry weather the roads are exceedingly sandy and rough, and in rainy weather, long stretches of mud puddles.

The greatest natural highways it was our pleasure to pass over lie in the State of Oklahoma. Oklahoma City is an excellent example of the benefits that are to be reaped thereby. Although only some twenty years old, it is a thriving metropolis, containing some 70,000 inhabitants, who own in all about a thousand automobiles. The farmers in the vicinity of Oklahoma City have realized the great value of the automobile and thousands are owned thereabout. With thousands of miles of beautiful, natural highways stretching away from her door, Oklahoma City proves the quick marketing place for the agriculturist with his crops, since with his automobile and the good roads he is able to land them at the market place in a short space of time. If he be a truck gardener he is able to have his produce in the hands of the consumer in much better condition than would be the case were he without the automobile, or level stretches of highway over which to drive it.

Built 380 Miles of Road in One Hour

COUNCIL BLUFFS, IA., July 4—The most remarkable feat in the history of good roadmaking was achieved in Iowa last week, when a road extending 380 miles, the entire width of the State was dragged in a single hour.

The dragging was the result of an agitation of more than six months. In March Governor Carroll called a good roads convention in Des Moines, and it was decided to have one piece of road, as nearly perfect as could be made from common dirt, extending from Davenport on the Mississippi to Council Bluffs.

What was left of Old Glory after the Regal completed the 5000-mile circle tour

Farmers along the way were induced to start the gigantic plan at exactly the same hour, and at 9 o'clock on the morning of the appointed day, hundreds of drags were on the job.

Farmers left their work, unhitched their horses from plows and cultivators, hitched them to drags, scrapers and road machines, and went to work.

"Pleasure" and "Commercial" Cars Defined

At the last meeting of the Association of Licensed Automobile Manufacturers, there was a general discussion of words that had crept into the automobile business which, in the opinion of many, were unfair to the trade as a whole. Such expression as "pleasure car," for a machine to carry passengers, was considered pretty poor nomenclature.

The term "commercial cars," as applied to freight-carrying automobiles, was considered a misuse of the term from the fact that all automobiles are commercial and practicable.

The general opinion seemed to be that in future, automobiles should be termed "passenger automobiles" and "freight automobiles," just as the railroads term their equipment "freight cars" and "passenger cars."

Crew of the "Plugger"—Lee Kuson, George Franklin, Norman Taylor and Roy Dean

Jersey Winners Each Rewarded

Each of the eleven cars that finished the recent 15-hour run of the New Jersey Automobile and Motor Club with a perfect score has been awarded a cup. The Motor Record cup goes to the Cadillac, winner in Class A. The Franklin, Haynes, and Buick pair in Class B were presented with cups by the Sunday *Call* of Newark, and the six winners in the other class were cared for by the club itself.

Dallas Dealers' Independence Day Meet

DALLAS, TEX., July 4—Without breaking any records or suffering any mishaps, the Dallas Automobile Dealers' Club held its first strictly amateur race meet at the Fair Grounds track to-day. A crowd of fully 20,000 was attracted and the program of seven events proved spectacular and enjoyable. The summary:

Five miles; for cars of 10 to 20 horsepower—

	Car	Driver	Time
1.	Maxwell	Sluder	6:18
2.	Hudson		

Three miles; runabouts—

	Car	Driver	Time
1.	Maxwell, Jr.	Socksteder	7:00
2.	Bush		

Three miles; stripped roadsters—

	Car	Driver	Time
1.	Marion	Funk	5:47
2.	Locomobile	Girard	
3.	Kissel Kar		

Three miles; touring cars—

	Car	Driver	Time
1.	Kissel Kar	Wilson	4:15.20
2.	Moline		
3.	Regal		

Three miles; stock touring cars—

	Car	Driver	Time
1.	Thomas	Lindsay	4:15.20

Five miles; free-for-all—

	Car	Driver	Time
1.	Simplex	Bertrand	5:58.20
2.	Marion		
3.	Locomobile		
4.	Kissel Kar		

In the Realm of the Makers

Palmer & Singer have added a six-cylinder forty horsepower and a four-cylinder, fifty horsepower automobile to their line for 1

The Sup Motor Vehicle Company has obtained ermit to build a brick factory at 1686 E. wood avenue, Buffalo, at a cost of $81,000.

The Moon Motor Car Company, of Indianapolis, has begun the erection of a handsome garage and salesroom on Capital avenue. It is two blocks from the heart of the business district.

John G. Utz, of the Abbott Motor Company, has a new engine, which he thinks will be suitable for aeroplane work. Experiments will be conducted in Detroit during the summer to try it out.

Harry L. Horning, secretary-treasurer of the Waukesha Motor Company, Waukesha, Wis., and Miss Elsie Muir, of Waukesha, were married recently and are now on a wedding trip through the East.

F. J. Manning, formerly connected with the Warner Speedometer Company and favorably known to the automobile trade, has also joined the Matheson Automobile Company as a salesman in the New York district.

The Ferromatic Tire Company, of Manitowoc, Wis., incorporated recently with a capital of $11,500, is now completing its tools, dies, patterns, etc., and plans to start manufacture of the new tire within a few weeks.

CHECK VALVE FOR LIMITING FLOW OF GASOLINE

Illustrating the check valve used on air-tight tanks made by Air-Tight Steel Tank Company, Pittsburg. (See Fig. 1.) When not in use the ball rests in the lower valve seat as shown in B. In this position it opens the ports G2, allowing the gasoline to flow in from the main reservoir as shown by the arrows D.

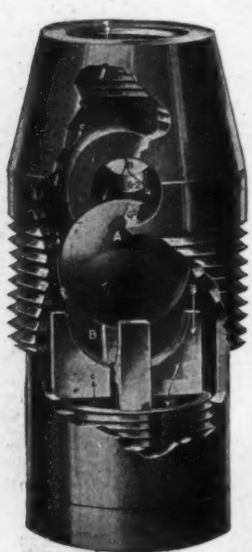


Fig. 1—Air-tight Steel Tank Check Valve

When pressure is applied in the chamber G2, the ball is forced up to A, closing the ports from G, permitting the fluid to pass on up and through the pipe and hose C.

In practice these valves are doing good work.

Frederick R. Simms, president of the Simms Magneto Company and founder of the Royal Automobile Club of Great Britain and Ireland has been selected as an honorary member of the Automobile Club of America by unanimous vote.

The Electric Welding Products Company, of Cleveland, has moved into its new factory addition, 94 by 100 feet, three stories high, and has installed new machinery, adding very largely to its capacity. The number of men employed approximates 350.

The Pennsylvania Rubber Company, which recently added $500,000 to its capitalization, making $2,000,000 in all, is now employing over 1,000 men at Jeanette, Pa. Herbert Du Puy, formerly president of the Crucible Steel Company, has assumed the presidency.

The Standard Auto Sales Company, of Youngstown, O., was incorporated with a capital of $10,000 to operate a garage and deal in automobile parts. The incorporators are Randall G. Anderson, A. Powers Smith, W. H. Anderson, J. H. Ewer and W. D. Euwer.

The Cincinnati Taxicab Company, of Cincinnati, O., was incorporated, with a capital of $20,000, to operate a taxicab service and do a general garage business. The incorporators are Frank E. Burnett, Allen L. Marshall, Chas. E. Everett, George B. Johnson and Alexander L. Sykes.

H. B. Harper, for the past two and a half years advertising manager and assistant commercial manager of the Ford Motor Company, as well as editor of the Ford *Times,* has assumed the position of export manager in New York just vacated by R. M. Lockwood.

T. W. Goodridge, prominently identified with the motor industry since its inception, has joined the forces of the Matheson Automobile Company. His first duties will be to establish agencies for the Matheson line of cars from Pittsburg to the coast.

The Troy Wind Shield Company, of Troy, Miami County, Ohio, was incorporated, with a capital of $10,000, to manufacture wind shields and other automobile accessories for automobile and garage purposes. The incorporators are H. F. Douglass, Henry L. Allen, F. A. Dillingham, C. G. Snook and B. Houser.

The Seagrave Manufacturing Company, of Columbus, will soon start to erect another large addition to its plant located in South Columbus. Some three months ago an addition was completed which doubled the capacity of the plant. The plans provide for an additional structure 150 by 200 feet, built entirely of steel and concrete. It is expected to have it completed and in operation by Fall of this year.

Robert M. Lockwood, located at 18 Broadway, New York, has shifted his allegiance from the Ford Motor Company to the Regal Motor Car Company, the position being the same one, that of export manager.

Fig. 2—How the Sonoscope operates

J. H. Dwight has resigned as secretary and treasurer of the Racine Steel Castings Company of Racine, Wis., to become secretary of the Kelly-Racine Rubber Company. S. H. Standish, formerly with the Finished Castings Company of Philadelphia, succeeds Mr. Dwight.

The Wentworth Motor Car Company, Cleveland agents of the Mora Company, gave a 1,000-mile sealed bonnet and starting crank test last week which proved eminently successful. The cars, which were driven by Mrs. Frank Adams and Miss Leota Mora, are both reported to have come through with flying colors.

SONOSCOPE FINDS THE KNOCK

Locating the knocks in a motor is not a difficult matter if they are neglected so that they graduate out of the "click" class, but the time to attack the problem is before the "click" becomes a knock. The American Sonoscope is an instrument which has been designed especially for this purpose. When it is placed in contact with the part whence a strange sound emanates, the little click will be accentuated until it assumes the proportion of the noise which comes from the blow of a trip hammer. It works on the principle of the Blake Transmitter working as a receiver. It occupies very little space and is free from all of the drawbacks of the character of instruments which persist in getting out of order even when horded under laboratory conditions. Fig. 2 shows the instrument being employed, and Fig. 3 is the instrument ready to respond to the demands of the autoist whose ear intercepts a strange noise emanating from the bowels of the motor. It is to be had from the Gaylor Automatic Stropper Company, Stamford, Conn.

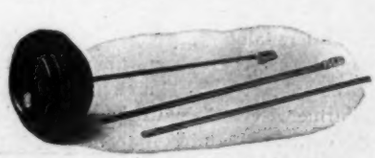


Fig. 3—The Sonoscope Ready for Use

E. L. Jones, formerly with the Anderson Carriage Company, has joined the sales forces of the Remy Electric Company, makers of the Remy Magneto.

Harry W. Doherty, sales manager of the Car Makers' Selling Company, distributors of DeTamble and Anhut pleasure cars and Dart delivery wagons, has gone to the Pacific Coast and will establish

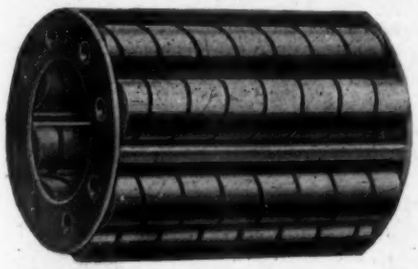


Fig. 4—One of the many types of Hyatt Roller Bearings, Made by the Hyatt Roller Bearing Company, Newark, N. J.

there a distributing company for California, Oregon, Washington, Idaho and Nevada, with branches in Los Angeles, San Francisco and Seattle.

The Starr Automobile Company, of Minneapolis, Minn., has decided to build its proposed plant at Downing, Wis., according to reports from that city. Two blocks of land near the railroad line have been purchased and construction work will begin at once. The main building will be 90 by 200 feet in dimensions, with two 40-foot L-shaped wings. Seventy-five men will be employed at the beginning.

BULL DOG CHASES THE CARBON

The removal of carbon from the top of the piston is an important part of running an automobile engine because if the deposit is allowed to remain it becomes incandescent and preignition results. The engine knocks and thumps and the trouble spoils the running of a good car. A device intended to correct this condition by cleaning off the carbon deposits is the Bull Dog Carbon Remover manufactured by E. S. Michener of New Castle, Pa.

This device is guaranteed by the manufacturer to correct the condition. It is made of special tough, soft wire, so constructed that it will not catch under the valves. It is inserted through the spark plug hole, and, in conjunction with a little kerosene, quickly scours off the carbon if the engine is run without ignition in the cylinder being cleaned for a space of two or three minutes. The Bull Dog may be removed through the spark plug hole when its mission has been accomplished. It sells for 75 cents postpaid.

Fig. 5—The Bull Dog Carbon Remover

Agency and Garage News

Roman Jeria, of Para, Brazil, has taken the Brazilian territory for the Cole "30."

The Wood Garage and Auto Company has been incorporated at Niles, Mich., by L. E., F. J. and J. W. Wood.

D. H. Miller, of Water street, Binghamton, N. Y., has taken the agency for the Cole "30" for Central New York State.

The Cole "30" will make its début among New Orleans, La., dealers. The Gentilly Automobile Company has been appointed Louisiana agent.

W. C. Leland, general manager of the Cadillac Motor Car Company, who has been confined to his home for several weeks by illness, has recovered.

The Hennepin Auto Company, 422 First avenue S. E., Minneapolis, has taken the northwestern agency for the Hart-Kraft line of light delivery cars.

New agencies for 1911 Alco cars have been established by the American Locomotive Company with the Van Auto Company, at St. Louis, Mo., and with J. H. Fleming, at Scranton, Pa.

Marmon cars are now sold in Detroit by Collins & Company. Many excellent prospects are reported. Their location at 730 Woodward avenue, well up in Automobile Row, is an excellent one.

Two more branches have been added to the already long list of the Regal Motor Car Company, the latest additions being at Denver and Indianapolis. The first is in charge of E. S. Norton and the latter is presided over by C. C. Rundell.

The Hartford Suspension Company has opened a Chicago branch at 1458 Michigan Avenue under the management of William P. Pollitzer. A machine shop fully equipped with modern tools and in charge of skilled operators has been installed.

The Pierce Arrow Motor Car Company, of Buffalo, has opened a foreign service branch at 22 Avenue de la Grande Armee, Paris, France. Information regarding tours and motor routes and duplicate parts and accessories will be provided at this office which has been established for the exclusive convenience of Pierce Arrow patrons.

The Washington Bridge Auto Company, Inc., has opened its new three-story garage on One-hundred and eighty-second street near Amsterdam avenue, New York. The building is of commodious size, 45 by 119 feet and the entire structure with a well-equipped basement is utilized by the company. There are accommodations for 200 cars. A full line of supplies and accessories is handled. The company has not assumed the agency of any manufacturing concern so far, but arrangements for handling a moderate-priced touring car and a small runabout are being perfected.

The Crow Motor Company, of Elkhart, Ind., has decided to take part in the racing game. The company has entered two stock chassis for the races on the Indianapolis Speedway July 1-4. The company contemplates enlarging its plant in the near future.

Bill Nye, secretary of the Atlanta Speedway Association, has asked for tentative entries for a local race meeting to be held on the Speedway July 23. If enough interest is shown among local owners, a sanction will be applied for and races run on that day.

The Automobile Club of Dayton, Ohio, will hold an automobile carnival on Friday and Saturday, July 15 and 16. The committee on arrangements consists of E. L. Edwards, chairman; John Solliday, Thomas P. Gaddis, A. A. Wentz and Arthur J. Stevens.

SPARK PLUG REFINEMENT OF FITTING INTEREST

Refinements in ignition systems are being made with such rapidity that spark plug engineers are awakening to the necessity on their part of keeping pace with general progress. It is the same problem which obtained between gun-makers and the fabricators of armor-plate a few years ago; no sooner did the gun-maker produce a projectile and a gun to fire it which would pierce 12 inches of alloy steel armor in its hardened state than the fabricator of the armor plate studied the situation sufficiently to make it 16 inches thick and twice as hard as it was before. Now that magnetos are capable of delivering a spark of great energy under high potential conditions, it remains for the spark plug engineers to equal, if not exceed, the progress thus registered. Obviously, a spark plug which will not stand up to the magneto stress becomes the weakest link in the chain. The "Spit-Fire" type of plug is shown in Fig. 6. It is made by A. R. Mosler & Company, 163 W. 39th street, New York, to serve this end.

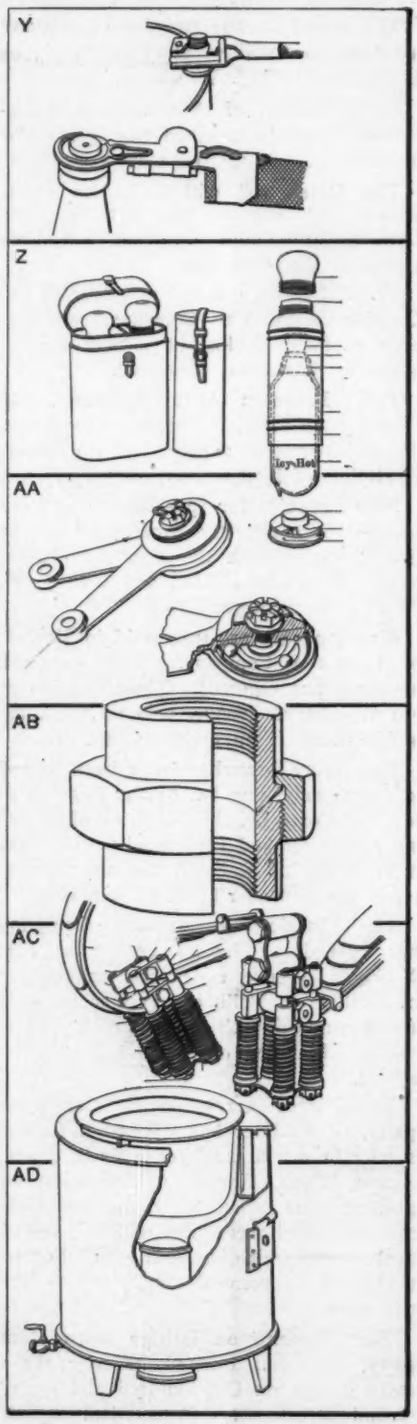
Fig. 6—Mosler Spit-Fire Spark Plug

Seen in the Show Window

SOMETIMES, when one's motor stops, the cause can be traced to a battery connector becoming loose or breaking—a trifle in itself, but an important item to the autoist. Much worry and sweating—possibly profanity—may be dispensed with by having in one's tool kit a supply of such indispensables. For the Becco connector (Y), manufactured by the Beck Company, of Rockville Center, N. Y., it is claimed that it cannot break or become loose, and that it accommodates itself to all positions of the battery caused by jarring or rough roads or otherwise. Another device marketed by the same company is the Becco terminal, which shows instantly when a cylinder ceases working whether the trouble is due to a bad spark plug or some electrical fault. The sparking gap indicates, when the switch is open, whether the electricity is properly going to the plug.

COMPARED with the early days of automobile touring, the motorist who contemplates a long trip across country nowadays may do so in comparative comfort, if not luxury. A cold drink on a hot day, or vice versa, is a blessing unalloyed, and no traveling kit should be minus some such accessory as the Icy-Hot Bottle (Z), manufactured by the company of the same name, in Cincinnati, O. These are furnished in quart and pint sizes, in black or russet leather, and lined with green velveteen. The outer casing is nickel-plated, and the glass vacuum bottle may be instantly removed from its metal casing for sterilizing, or if broken a new filler inserted. The screw top is in the form of a drinking cup.

HOWEVER excellent may be the spring equipment of a car, the use of some form of shock absorber to take up the constant jar and vibration which are inseparable from a trip over rough roads, is absolutely necessary if the car, its engine and the tires are to be assured of a reasonable length of life. For the device here illustrated, the Ball-Bearing Shock Absorber (AA), now being marketed by the company of the same name at 25 Broad street, New York, the claim is made that they positively neutralize all jounces and jolts without tying, binding or detracting from the best action of springs, reducing the wear on the parts and minimizing to almost the vanishing point the possibility of breakage. They are made of the finest steel drop forgings, with highly tempered double incline ball runways and best steel balls. A metal dust guard protects all wearing parts from dust and grit.



Y—The Becco Connector and the Becco Terminal
Z—The Icy-Hot Bottle and Holder for Touring
AA—The Ball-Bearing Shock Absorber—a Necessity for Rough Roads
AB—The Air and Gasoline-Tight Octagon Kewanee Union
AC—The Velvet Auxiliary Spring—Another Form of Shock Absorber
AD—The Buek Metal Melter—Handy to Carry from Shop to Job

EVERY repairman, garage-keeper and owner of an automobile realizes the necessity of tight tubing. Where a union is necessary in a tube line, either for water or gasoline, a leak is possible unless a positively tight joint can be secured by means of a reliable connection. Some of the claims made for the Octagon Kewanee Union (AB), manufactured by the National Tube Company, Hudson Terminal Building, New York, are the absolute tightness of the brass-to-iron thread connection at the ring; the brass-to-iron joint ball seat; and the possibility of easily disconnecting the joint if necessary. These unions are subjected to a 100-pound air pressure test, under water, to insure absolute tightness.

LIKE riding on velvet—an apt simile when used in connection with the spring-within-a-spring device now being sold by the John W. Blackledge Mfg. Co., 1400-1402 Michigan avenue, Chicago. The Velvet Auxiliary Spring (AC), it is claimed, performs all the functions of the spring link, eliminating all side sway which might have a tendency to bring undue strains on the other parts of a car. The eight coils which support the weight are surprisingly light, and are consequently very sensitive, interrupting and distributing the road shocks so effectually that the sensation is akin to riding on velvet.

LATTER-DAY shop needfuls have a recent worthy addition in the Buek Metal Melter (AD), made by the Frictionless Metal Company, of Chattanooga, Tenn. This handy repair device has the prime merit of being of such size and weight that it may be easily carried from shop to job, saving time and doing away with the necessity of taking job to shop. Gas is the fuel used in this melter, but an advantage claimed for the Buek over other forms of gas-using melters is a 30 per cent. saving, accomplished by means of a warm-draft burner. In operation it is extremely simple, and there is no additional expense incurred for fan blast or compressed air.

ELECTRIC lighting is now being practiced in connection with automobiles on a large scale, and the "Electrobola" is one of the latest bidders for honors in this field. The lamp is in the form of a parabola, 10 1-2 inches in diameter by 7 inches deep and weighs 7 1-2 pounds. It throws a beam of 2500 candlepower, and is aimed at the road 700 feet ahead of the automobile. It is made by the Avery Portable Lighting Company, Milwaukee, Wis.